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THE UNIVERSITY OF ILLINOIS AT CHICAGO

FRIDAY, DECEMBER 28, 1838.

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MESSAGE

FROM

THE GOVERNOR

TO

THE GENERAL ASSEMBLY OF ILLINOIS,

TRANSMITTING

THE SEMI-ANNUAL REPORTS

OF THE

BOARD OF COMMISSIONERS OF PUBLIC WORKS,

MADE

IN COMPLIANCE WITH THE TENTH SECTION

OF THE

ACT ESTABLISHING A GENERAL SYSTEM

OF

INTERNAL IMPROVEMENTS.

VANDALIA:

WILLIAM WALTERS, Public Printer.

1838.

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MESSAGE.

EXECUTIVE DEPARTMENT,

Vandalia, December 27, 1838.

SIR: In compliance with the 10th section of the act establishing a general system of internal improvements, I have the honor, herewith, to transmit to you the semi-annual reports of the Board of Commissioners of Public Works, together with exhibits and accompanying documents, which embrace all the information in possession of this Department, in relation to the conduct and management of the public works under the direction of the said Board.

The great importance of these documents renders it highly necessary that the originals should be carefully preserved on the files of this Department; and their voluminous character would have prevented me, in any reasonable time, to have them copied.

I would therefore respectfully recommend to the House of Representatives the propriety of appointing a committee to superintend their printing, with a view to preserve, as far as practicable, the originals without being defaced or injured, and cause them to be returned to this Department.

I have the honor to be, sir,

Your obedient servant,

THOMAS CARLIN.

To the Hon. the SPEAKER
of the House of Representatives.

REPORT

OF

THE BOARD OF PUBLIC WORKS.

VANDALIA, ILL., Dec. 26, 1838.

To his Excellency THOMAS CARLIN,
Governor of the State of Illinois:

SIR: In accordance with the requisitions of the 10th section of the law establishing a general system of internal improvements, the undersigned, Commissioners of the Board of Public Works of the State of Illinois, submit to you the following

REPORT.

In performing the various duties enjoined upon them by law, the Board have found many difficulties to encounter. This was partially owing to the want of experience on the part of the officers and agents employed, the scarcity of mathematical instruments and apparatus necessary to a survey and reconnoissance of the different lines of road contemplated by law. In the first lettings of contracts, too, the absence of experienced and energetic contractors presented difficulties which no energy or efforts of the Commissioners could surmount; yet it is believed that, in most instances, contracts were let, at fair prices, to responsible and energetic contractors.

In the performance of this duty, they have met with various other difficulties. The law under which they were required to act was found, upon experience, to be, in many particulars, defective.

The Commissioners were required to purchase lands for the use of the State, not absolutely necessary to the construction of any particular work. They were required to establish an office at the seat of Government and employ a secretary to keep said office. They were required to employ engineers and general agents, whose services could not be confined to any particular work; yet all the appropriations made by law were special, and confined to particular objects, and no fund was provided for any of those general objects of expenditure. Defects were found to exist in various other parts of the act, that render it difficult to be understood, and often still more difficult to execute.

The present mode of acquiring the right of way over the land of the citizens has been a source of much difficulty to the Commissioners, dissatisfaction to the land owners, and, in many instances, great and unavoidable cost to the State.

The mode of declaring contracts forfeited, and of reletting those contracts, has been found defective, and, under some circumstances, must operate to prevent the progress, or occasion a very great delay in the prosecution of the work.

Doubts have been suggested as to the power of the Board to bestow upon its individual members power to do or perform acts absolutely necessary to be done in their respective circuits, or in other circuits for which they were not expressly commissioned, in reference to the location of roads and other duties: and in short the whole law seems to have been suited to the duties of a Board, appointed generally for the whole State, whose powers should be general, operating in all parts of the State alike, and not of a Board composed of members elected for, and whose duties would seem to be confined to, particular circuits.

Great inconvenience, cost, and uncertainty have been met with by the various members of the Board in executing the law in relation to letting contracts. The different members of the Board, and the works upon which they are engaged, must necessarily be far separate from each other. The law requires the attendance of two Commissioners at each letting, and makes no provision (in case the second Commissioner should not attend) that the acting Commissioner upon the line may call to his aid any judge, justice of the peace, or other officer, so that if by any casualty, there should not be two Commissioners present, the whole object of the law should not be defeated, the lettings fail, and the work delayed, at great cost, and injury to the public interest.

The law has also been found defective in the provisions for paying contractors and others engaged in the construction of the different works. If it was intended by the provisions of the 24th section that no draft should be drawn in favor of this class of persons for a less sum than twenty thousand dollars, then indeed the law becomes almost inoperative, as in paying monthly estimates (which is found to be necessary) very few contractors perform work to that amount. A Commissioner cannot have on hand more than twenty thousand dollars at any one time, (which, under a proper provision of the law, would be a sum sufficiently large;) yet it may and sometimes has happened that he has been required to pay, monthly, more than forty thousand dollars to contractors, no one of whom was entitled to receive a draft upon the Fund Commissioners for twenty thousand.

Some difficulty exists in the proper construction of the law in relation to the duty of the Board, or the Commissioners, in the location of the roads within their respective circuits. This duty, in almost every instance, has been performed by the engineers engaged upon the lines, after a thorough examination and survey of every plausible route; and the one that appeared cheapest, and in all respects the best for the interest of the State, has been adopted. The Commissioners have not believed themselves at liberty to depart from those routes, notwithstanding how much it might be desired for the promotion of individual interest, or the supposed interest of isolated parts of the community through which the roads pass.

A difficulty has also arisen as to the proper construction of the 33d section of the law. By some members of the Board, the proviso to the said section was understood to refer to county or other important trading towns, by which the law, by the various provisions of the 18th section, expressly required the roads to pass, and that those towns might be avoided and lateral branches constructed thereto, if, in the opinion of the Board, the public good required it. Others understood, from this law, that it was the duty of the Board, without any discretion whatever, to locate the roads to the towns mentioned in the law, and that the places mentioned in the 33d section, to which lateral branches were authorized to be made, were towns not mentioned, situated within five miles of the main lines of the different roads. If this law could have been understood to bear the former construction, many thousands of dollars could have been saved to the State, and the roads, in many instances, rendered more useful to the community, as many of the towns, made points in the law, were found to be so situated that they could not be reached by the main lines without great cost, and much delay in the construction of the works. In the course of practice under the present law, the Board has found an evident defect in the provisions in relation to paying estimates upon work done, and materials furnished by contractors. After an estimate has been paid upon materials delivered upon the line of the road, it must necessarily be left there to be used and placed in the work by the contractor; yet there is no positive law to protect this property from the force of an execution against the contractor. Although it may be contended that property so situated could not be made subject to an execution, yet it would leave no doubt if the statute made a proper provision against it. With a view to protect the interests of the State, the Board has thus pointed out what they have found to be defects in the law, that it may be seen and remedied by those whose business it is to guard the public good, and look after its interest.

When the Board was first organized, their attention was turned to the 52d section of the Internal Improvement law. By this section it would seem that the Board were required, without any discretion whatever, to survey and locate all said roads, and put under contract a part of each, so soon as they could possibly perform the same. By the 25th section of the same law, it is provided that the Board should order a fair, equitable, and uniform progress of all the said works, at the same period of time; and that all of said roads should be immediately commenced at their intersection and connection with navigable streams; and that they should progress in both directions from said streams. Under these provisions of the law, the Board could not misunderstand their duty. Almost every railroad projected in the State intersected navigable streams in various places. The Board was clothed with no discretion whatever. They were bound by law to commence the construction of all the roads, so soon as the same could be located and fitted for contract. They felt no disposition to shrink from this duty. The members had no doubt of the propriety of the law, yet they had nothing to do with the policy thereof, or the wisdom of its provisions.

At the first meeting and organization of the Board, an ordinance was passed giving all the power to each Commissioner that, by law, was given to the Board, in relation to the location and construction of all the

railroads within their respective circuits, commencing as the law directed. This was believed to be proper, as it was clear, from the law that neither the Board, nor any one of its members, could proceed faster, or do more in a less time, than the law contemplated; yet, after this power was conferred, it was thought prudent, by most of the Commissioners, not to let or to contract any considerable portion of the public works until it was ascertained that the Fund Commissioners should be successful in procuring the necessary funds to progress with the work.

But this precaution was not deemed necessary in relation to the Northern Cross railroad, as it will be seen, by reference to the 53d, 54th and 55th sections of the law, that a preference was given to this road, and that the same should be put under contract, whether any money was obtained or not, provided the contractors would agree to receive State bonds for the work performed by them.

Under these provisions, the Commissioner of the first judicial circuit proceeded to survey, locate, and put under contract, all that portion of the said road situated between the Illinois river and Springfield, in Sangamon county; all of which location and acts of said Commissioner, and the contracts there made, were approved and confirmed as the act of the Board.

Because of this provision in the law, and by the reason of the letting of these contracts, said road is in a greater state of forwardness than any other portion of the railroads of the State. Several miles have been completed, and a locomotive engine is now in operation thereon.

So soon as it was ascertained that money had been obtained, and a prospect existed of procuring means to pay contractors, each Commissioner proceeded with every possible despatch to commence the different works at the proper points, and to survey the whole of said roads. It was, however, deemed prudent to change the order in relation to putting roads under contract, so as to provide against letting any work without an order of the whole Board for that purpose. This was done to arrive at uniformity and to insure a gradual and equal progress of all the public works in the State.

Under this arrangement, and under the provisions in relation to the Northern Cross railroad, the following parts of the different works have been put under contract, up to this date:

Central Railroad.

	Miles.	
Grading from Galena, southerly - -	20	
Grading from Peru, northerly and southerly - -	22	
Grading and timber from Cairo, northerly - -	23	
Grading across the Oakaw river, near Vandalia - -	4½	
	<hr/>	69½

Peoria and Warsaw Railroad.

Grading from Peoria, westwardly - -	12	
Grading from Warsaw, eastwardly - -	12	
	<hr/>	24

Alton and Shawneetown Railroad.

Grading and timber from Shawneetown to Equality	12	
Grading at the crossing of Silver creek - -	3	
	<hr/>	15

Northern Cross Railroad.

Grading from Quincy to Columbus - -	16½	
Grading from Danville, westwardly - -	18	
Whole work from Meredosia to the Sangamon river	64	
Naples branch - -	3½	
Grading westwardly from Meredosia - -	3	
	<hr/>	105

Alton and Mount Carmel Railroad.

Whole work from Alton to Edwardsville - -	15	
Grading and timber from Mount Carmel to Albion	18	
Grading and viaduct at the crossing of the Oakaw -	2	
Grading at the crossing of the Little Wabash - -	3	
	<hr/>	38

Alton, Shelbyville, and Paris Railroad.

Grading and superstructure from Alton, eastwardly	13	
Grading and timber from the State line, westwardly	18	
Grading at the crossing of the Embarrass river -	2	
	<hr/>	33

Bloomington, Mackinaw, Peoria, and Pekin Railroad.

Whole work from Pekin to Tremont - - -	9¼	
	<hr/>	293¼
	<hr/>	<hr/>

Making the whole amount of railroad, now under contract, two hundred and ninety-three miles and three-fourths; one hundred and five miles

of which is to be completed. Of thirty miles, the grading and timber for the superstructure are let; and of the residue, the grading only is let.

The various parts of the roads under contract consist of deep cuts, heavy embankments and costly viaducts, and are by far the most expensive portions of the whole work. This is owing to the fact that the lines under contract pass through the highlands and broken country bordering upon the navigable streams and other water courses of the country; consequently, the average cost, per mile, of the roads under contract, will far exceed that of any other portion of the roads of the State. A fair average of the roads now under contract, including superintendence, engineering, turnouts, depot buildings, and all incidental expenses necessary to complete the works, may be safely computed at twelve thousand five hundred dollars per mile.

The Board has procured to be surveyed and measured all the railroads contemplated by law in the State. The following detailed statement will show the length of each road between the points mentioned in the law—the whole length of each road—and the total length of all the roads contemplated in the State.

SEVENTH DIVISION—*Central Railroad.*

	Miles.
From Cairo to Vandalia	155
Shelbyville	36½
To Decatur 36 miles—Bloomington 43½	79½
To the termination of the Illinois and Michigan canal	60
To Savannah 93¾ miles—Galena 30¾	126½
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Making the total length of the Central railroad	457½

EIGHTH DIVISION—*Alton and Mount Carmel, or Southern Cross Railroad.*

From Alton to Edwardsville	14
To Carlyle	37
To Salem	23
To Fairfield	39
To Albion	16
To Mount Carmel	18
	<hr/>
	147

Shawneetown Branch.

From the intersection near Edwardsville to Lebanon	18
To Nashville	30
To Pinckneyville	19
To Frankfort	30
To Equality	38
To Shawneetown	12
	<hr/>
	147

	Miles.
From Alton to Mount Carmel (as above) - - -	147
Shawneetown branch (as above) - - -	147
Making the total length of this road - - -	<u>294</u>

NINTH DIVISION—*Northern Cross Railroad.*

From Quincy to Columbus - - - -	16½
To Clayton - - - -	12
To Mount Sterling - - - -	9½
To Meredosia - - - -	15½
Naples branch - - - -	3½
To Jacksonville - - - -	23½
To Springfield - - - -	33½
To Decatur - - - -	37½
To Sidney - - - -	47¾
To Danville - - - -	23¾
To State line of Indiana - - - -	11½
Making the total length of this road - - -	<u>234½</u>

TENTH DIVISION—*Shelbyville and Paris branch of Central Railroad.*

From Shelbyville to Charleston - - - -	34
To Paris - - - -	27
To State line of Indiana - - - -	10½
Making the total length of this road - - -	<u>71½</u>

ELEVENTH DIVISION—*Peoria and Warsaw Railroad.*

From Peoria to Canton - - - -	32
To Macomb - - - -	37
To Carthage - - - -	28
To Warsaw - - - -	19
Making the total length of this road - - -	<u>116</u>

TWELFTH DIVISION—*Alton and Shelbyville Railroad.*

From Lower to Upper Alton - - - -	2
To Hillsborough - - - -	44
To Central Railroad - - - -	45
Making the total length of this road - - -	<u>91</u>

THIRTEENTH DIVISION—*Belleville and Lebanon Branch.*

From Belleville to the place of intersection, at or near Highland -	<u>23½</u>
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FOURTEENTH DIVISION—*Bloomington, Mackinaw, Peoria and Pekin Railroad*

	Miles.
From Bloomington to Mackinaw town	20
From thence to Peoria	17
From Mackinaw town to Pekin	16 $\frac{3}{4}$
Making the total length of all the branches of this road	<u>53$\frac{3}{4}$</u>

The following list shows the total length of each road, and the total of all the roads projected in the State:

	Miles.
1 Central Railroad	457 $\frac{1}{2}$
2 Southern Cross Railroad	294
3 Northern Cross Railroad	234 $\frac{1}{2}$
4 Shelbyville and Paris branch of Central Railroad	71 $\frac{1}{2}$
5 Peoria and Warsaw Railroad	116
6 Alton and Shelbyville Railroad	91
7 Belleville and Lebanon Railroad	23 $\frac{1}{2}$
8 Bloomington, Mackinaw, Peoria, and Pekin Railroad	53 $\frac{3}{4}$
Making the total length of all the roads in the State	<u>1,341$\frac{3}{4}$</u>

The following table shows the average cost, per mile, and the total cost, of each and all of said roads:

	Names of Roads.	Cost per mile.	Total cost.
1	Central Railroad	\$8,326 00	\$3,809,145 00
2	Southern Cross Railroad, and Alton and Shawneetown Railroad	8,200 00	2,410,800 00
3	Northern Cross Railroad	8,430 00	1,976,335 00
4	Shelbyville and Paris Railroad	10,589 00	757,113 50
5	Peoria and Warsaw Railroad	8,331 00	966,396 00
6	Alton and Shelbyville Railroad	8,295 00	754,845 00
7	Belleville and Lebanon Railroad	7,000 00	164,500 00
8	Bloomington, Mackinaw, Peoria, and Pekin, Railroad	11,736 00	630,810 00
	Total cost of all of the said roads	- -	<u>11,470,444 50</u>

In making these estimates, the Board has included all the expenditures for superintendence, engineering, and all other incidental expenses. Easy grades have, in general, been adopted, and in all cases calculations have been made for the most useful and durable structures; and the Board has no doubt but the works may be constructed, upon the most approved plans, at the cost estimated upon each work. It is believed that, in every instance, the lines may be improved, locations changed, and improvements made in the construction, that may lessen the cost far below those prices.

The average cost of some of the roads exceeds the sum heretofore supposed to be sufficient, but this, in a great degree, is owing to the policy

adopted in the law of confining the locations to particular points situated upon high and elevated grounds, or surrounded by deep ravines and an undulating surface.

The total cost of these roads exceeds the sums heretofore appropriated for their construction. This is mainly owing to the fact that the roads, upon actual measurement, are found to be longer, and consequently to accommodate more inhabitants, and supply the wants of a much greater extent of country, than was at first contemplated. In addition to the railroads heretofore mentioned, the Board has proceeded to improve the great western mail route, as required by law. In performing this duty, they have endeavored so to distribute the benefits to be derived from the appropriations to this work, that the same should be felt at all points where improvement was necessary, without laying out large sums, and exhausting the appropriation by making costly improvements at any one place. By this course, it is believed that most of the difficult places upon this great thoroughfare may be remedied by the present appropriation. Accompanying this report are those of the Commissioners of the second and fourth judicial circuits, to which reference is made for further particulars in relation to this work.

The total length of this road is found, upon actual measurement, to be one hundred and fifty-two miles, and it is believed that very few of the improvements of the State will confer greater benefits, or could be made sooner to yield a profit, than this. The total amount of money expended upon said road, up to the first Monday in this month, is found to be \$102,987 89. For particular places, and objects of its expenditure, reference is made to the reports of the Commissioners of the second and fourth judicial circuits, heretofore referred to.

GREAT WABASH IMPROVEMENT.

Since the passage of the law in relation to internal improvements in this State, and providing for the improvement of the navigation of the Great Wabash, in connection with the State of Indiana, that State has appropriated the additional sum of fifty thousand dollars, which makes the total sum appropriated for that object by said State equal to the sum appropriated by the State of Illinois.

This money has been placed under the direction of Col. Thos. H. Blake, of Terre Haute, in that State, who, on the part of the State of Indiana, together with the Commissioner of the fourth judicial circuit, on the part of the State of Illinois, has proceeded to project, and to put into operation, a plan for the improvement of the navigation of the Grand Rapids upon this stream. Contracts have been let, and said improvement is in progress.

The contract prices for the work already let falls short of the appropriations made by the two States for that object.

The total amount of money expended by the Board, on the part of the State of Illinois, for this portion of the public improvements, amounts to the sum of \$6,183 82. For further particulars in relation to this improvement, reference is made to the report of the Commissioners of said fourth circuit.

THE ILLINOIS RIVER.

The first season after the organization of this Board, a survey of this river was commenced and carried on under the patronage of the United States: and the Board was encouraged in the belief that all the necessary information would be derived from that source; but in this the Board was disappointed. No information was ever communicated of the result of that examination; consequently a delay was occasioned for that season. After this, an unusual continuance of high water prevented the necessary examinations of the river, until about the month of September last, at which time the Commissioners of the first and seventh judicial circuits proceeded to make examinations, and ascertain, as far as was practicable within the short time allowed, the character and extent of the obstructions to the navigation of this stream.

From those examinations it is apparent that few, if any, of the streams within the valley of the Mississippi present a current so easy and a channel so favorable for navigation as this river.

The obstructions are mostly deposits of sand and gravel, which are few in number, and, except in stages of extreme low water, present but little obstruction to a free and safe navigation.

These stages of water, however, often and indeed almost always occur at a time when the free navigation of the stream is most useful to the inhabitants. It is confidently believed that the damage occasioned to the inhabitants of the valley of this stream, during the last season of unusual low water, would amount to a sum sufficient to complete all the improvements contemplated upon this stream.

The Board is, therefore, resolved to make every effort to improve the navigation of this valuable channel of communication. The sum already expended upon this work has only been for the expenditures incidental upon those examinations, and amount to the sum of \$301 02. For more minute information in relation to this stream, reference is made to the report of the Commissioners of the first and seventh judicial circuits, hereto annexed.

ROCK RIVER.

The sum of one hundred thousand dollars was appropriated by law for the improvement of the navigation of this stream, and the Board was required to commence their operations thereon by removing the most formidable obstructions nearest the mouth.

Upon an examination of this river, it was found that, with the proper improvements, it would be well adapted, at all seasons, to navigation for steamboats drawing three feet water, as far up as the State line.

The most serious obstruction to the navigation of this river was found at Vandruff's Island, three miles above the mouth, commonly called the Lower Rapids. This obstruction was put under contract by the late Col. Stephenson, formerly member of this Board for the sixth judicial circuit, and the contract price amounts to sixty thousand three hundred and eighty-nine dollars. The next obstruction was found at Prophet's village, about forty-five miles above the mouth.

But the next most serious obstruction to the navigation of this stream was found in the Upper Rapids, sixty miles from the mouth, and will cost over eighty-five thousand dollars to remove. This obstruction was also advertised to be let, by Col. Stephenson, but, owing to the fact that the sum required to make this improvement, together with the improvements below said obstruction, was greater than the appropriation for that purpose, it was not let to contractors, and all further operations thereon were suspended.

It is ascertained that the sum now appropriated for the improvement of this river is not sufficient to complete this valuable work, and that the additional sum of seventy-six thousand dollars will be necessary to this object. It is believed however, by the Board, that the object to be attained would fully justify this further expenditure. For further particulars in relation to this river, reference is here made to the annexed report of John Dixon, acting Commissioner of the sixth circuit, and the accompanying documents.

KASKASKIA RIVER.

The improvement of the navigation of this stream has long been a desirable object, owing to its central position, and from the fact, too, that it passes far into the interior of the State, and is surrounded by a country not exceeded by any for fertility of soil and salubrity of climate.

This particular improvement was placed under the control of the Commissioner of the second judicial circuit. Every effort has been made by him to forward the work, and, although greatly delayed by sickness and other unavoidable causes, this very desirable improvement is in a state of forwardness that ensures the most happy results. For further particulars in relation to this subject, reference is made to the report of the Commissioner in charge of the work. The total amount expended upon said river, up to the first Monday in this month, is two thousand and fifty-seven dollars and forty-seven cents; which sum has been expended in the engineering service, and in removing obstructions to the navigation.

LITTLE WABASH RIVER.

The improvement of the navigation of this river was placed under the immediate direction of the Commissioner of the third judicial circuit. Under his direction this river has been surveyed, and the locality and nature of the obstructions to the navigation determined.

It was thus ascertained that the appropriation made was inadequate to accomplish the object in the manner pointed out by law. The obstructions to the navigation by the deposit of timber in the bed of the river are now being removed; which, when completed, will greatly facilitate the navigation. This river presents the appearance of a natural canal, commencing in the county of Effingham, and passing through several of the finest counties of the State, the navigation of which is obstructed by two principal rapids. These rapids are occasioned by reefs of rocks over which the river passes, and at which points the principal

descent in the stream occurs. Both shores of this river at each of these points are private property, and dams are built and machinery erected at each, over which the State has no control. Before the navigation of this river can be thoroughly improved, which can be done only by dams and locks, it will become necessary that those rapids should be converted into State property. To do this, a much larger sum than the present appropriation will be necessary; yet the Board is clearly of opinion that the property when purchased and improved, as must necessarily be done to improve the navigation in a proper manner, and the great advantages that must necessarily accrue to the inhabitants of this fertile region of country, would fully justify an appropriation adequate to the undertaking.

The sum expended upon this river, up to the first Monday in this month, is \$2,936 41½. For further particulars in relation to this part of the public improvement, reference is here made to the annexed report of the Commissioner of the third judicial circuit, and the accompanying documents.

Thus the Board has presented a detailed statement of their operations upon the rivers. They will now proceed to give a detailed account of the several sums expended upon the several public works under their control; all of which will appear in the following table:

Numbers of Circuit, and amount expended by the Commissioners upon each work.

Names of roads and rivers.	First circuit.	Second circuit.	Third circuit.	Fourth circuit.	Fifth circuit.	Sixth circuit.	Seventh circuit.	Total amount expended on each work.
Central railroad . . .	3,550 67	7,644 25	39,643 60½	2,353 10	-	55,482 26	37,091 31	\$145,765 19½
Western mail route . . .	-	74,810 94	-	28,176 95	-	-	-	102,987 89
Alton and Mount Carmel railroad . . .	-	30,958 76½	1,975 29	43,795 55	-	-	-	76,729 60½
Alton and Shawneetown railroad . . .	-	-	42,763 75	-	-	-	-	42,763 75
Alton and Shelbyville railroad . . .	4,535 79	665 07	-	-	-	-	-	5,200 86
Northern Cross railroad . . .	467,822 84	-	-	42,280 85	4,662 74	-	545 00	515,311 43
Central Branch railroad . . .	-	-	-	51,203 05	-	-	-	51,203 05
Peoria and Warsaw railroad . . .	-	-	-	-	75,225 57	-	-	75,225 57
Belleville & Lebanon branch of Alton and Mt. Caranel railroad . . .	-	371 48	-	-	-	-	-	371 48
Bloomington and Mackinaw railroad . . .	38,022 77	-	-	-	-	-	-	38,022 77
Great Wabash river . . .	-	-	-	6,183 82	-	-	-	6,183 82
Illinois river . . .	100 00	-	-	-	-	-	201 02	301 02
Rock river . . .	-	-	-	-	-	13,933 38	-	13,933 38
Kaskaskin river . . .	-	2,057 47½	-	-	-	-	-	2,057 47½
Little Wabash river . . .	-	-	2,936 41½	-	-	-	-	2,936 41½
	514,032 07	116,507 98	87,319 06	173,993 32	79,888 31	69,415 64	37,837 33	1,079,793 70½

The Board, in making this report, have thought it their duty to collect and embody every possible information that might shed light upon the very important and all absorbing subject of internal improvement in our State. With this view they have collected and herewith transmit copies of their individual reports, and of the different engineers engaged in the reconnoissance and location of the different works, thereby furnishing a mass of information that cannot fail to give to the people, and to their representatives, a full account of the proceedings of the Board, and at the same time enable them to form correct conclusions as to the inexhaustible resources of our State, and at present dormant sources of wealth and prosperity, which may be brought into action by the uniform progress and vigorous prosecution of our system of internal improvements.

If slight defects have been found in the law organizing the system, or if errors shall have been committed in carrying it into execution, it is what might reasonably have been expected in a system so extended, brought into existence by the spirit of compromise amidst conflicting and adverse interests, and carried into execution by agents heretofore without experience in such employment.

That the different members of the Board, in this first attempt, have in all things performed their various and often difficult duties, strictly in accordance with the spirit and intention of the framers of the law, could not have been expected.

In locating thirteen hundred miles of railroad, and performing other duties equally difficult, it could not well be otherwise than that errors of judgment should occur, and that we should be brought into contact with private interest, and become the unwilling though necessary and unavoidable causes of disappointment to some, and the prostration of splendid but visionary schemes of speculation in others. Under these circumstances it was not expected by us that we could perform those various duties to the entire satisfaction of all parties, or that however correct might be our course, or strongly marked by wisdom our acts, we could escape without censure, or avoid the malevolence of the disappointed.

In conclusion, the undersigned would say that the experience they have had in commencing and prosecuting the present plan of internal improvements, which in their opinion is to be the ornament and honor of the State, and the foundation of its prosperity and wealth, has brought their minds to the conclusion that the onward path is the high road to success, and that to recede or even to falter would be to violate good faith, to disappoint the hopes and dampen the energies of this great and enterprising State.

We invite scrutiny and examination into all our public acts, indulging

a hope that we may be accredited the good we have done, and that, if errors have been committed, our successors may see and avoid them.

All of which, sir, is most respectfully submitted,

And we subscribe ourselves,

Your most humble and obedient servants,

WILLIAM KINNEY,

President.

M. McCONNEL,

Commissioner of the First Circuit.

ELIJAH WILLARD,

Commissioner of the Third Circuit.

M. K. ALEXANDER,

Commissioner of the Fourth Circuit.

J. WRIGHT,

Commissioner of the Fifth Circuit.

JOHN DIXON,

Commissioner of the Sixth Circuit.

Mr. Peck, Commissioner for the seventh circuit, having resigned before this report was made, has not therefore signed the same.

EXHIBIT No. I.

REPORT OF M. M'CONNEL,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, December 3, 1838.

To the PRESIDENT of the

Board of Public Works of the State of Illinois:

At the date of my last report, it will be seen, by a reference thereto, that the amount of money expended by me upon the public works under my charge, up to that date, amounted to the sum of one hundred and fifty-one thousand and thirty-three dollars and ninety-four cents. Of that sum, there was at that date paid out for work done, and materials furnished upon the Northern Cross railroad, the sum of one hundred and twenty-four thousand four hundred and twelve dollars and forty-five cents. There was then expended for surveys, and locating the various works under my charge, the sum of twenty-seven thousand six hundred and twenty-one dollars and ninety-four cents. At that time there were sev-

eral locating parties in the field. One party was under the direction of Mr. Wm. Pollock, engaged in the location of the roads from Peoria and Pekin to Mackinaw town, and thence to Bloomington, in McLean county, and also in the location of the Central railroad between Bloomington and the north fork of the Sangamon river, via Decatur, in Macon county. This work has been completed by Mr. Pollock so far as to be able to determine the probable cost of the construction of those routes. Mr. Pollock has made a full and complete report of all those surveys to Mr. Bucklin, the principal engineer of the western district; which is hereto attached, and referred to for further information in relation to said survey. Another of these parties was under the direction of Mr. Bucklin, principal engineer, in relocating that part of the Northern Cross railroad situated between Jacksonville, in Morgan county, and Springfield, in Sangamon county.

This part of the Northern Cross railroad had previously been surveyed and located by M. A. Chinn, but, in the opinion of Mr. Bucklin, chief engineer, the location was not made at that time in the proper place, and consequently, by his request, a company was again organized, and the road located under his immediate direction.

The other locating party was placed under the direction of Frederick Hawn, Esq., senior assistant engineer, and was engaged in the location of the road contemplated to be constructed from Alton to Shelbyville. This road I understand has been surveyed, and a report made to the Commissioner of the second judicial circuit, in whose circuit is situated the commencement and termination of said road. The only agency that I have had in this part of the public service has been to furnish the camp equipage, and to pay all the expenses of making said survey and location.

At the June meeting of the Board, all that part of the Northern Cross railroad, situated in the fifth judicial circuit, was placed under my immediate supervision. Previous to that time, contracts for the grading were let upon said road, from Quincy to Columbus, in Adams county. Those contracts have proceeded speedily, and all the jobs appear to be in a prosperous state of forwardness.

At the same meeting of the Board, it was ordered that the grading of three miles of said road on the Illinois river, commencing opposite Meredosia, be put under contract. In pursuance of this order, I proceeded to advertise said three miles as the law directs; and, in August last, the same was let to Messrs. Davenport, Henry & Co., at fair prices. Much difficulty was encountered by the engineers in estimating the cost of the large amount of masonry found necessary in this low and inundated bottom. No suitable stone could be procured within several miles of the work; and the quality when found was not known to be good.

All this taken into consideration, together with the fact that these three miles run through a low bottom, inundated by the Illinois river, almost every year, to the depth of from four to eight feet—it was ascertained that this part of the road would cost a sum far beyond all former calculations. To avoid as much as possible this result, it was determined to construct the four large abutments, necessary upon this work, of timber. Those abutments were also let to the same persons who took the contract for the embankment.

Immediately after this contract was taken, the country was visited with an unusual degree of sickness, which greatly retarded the progress of the work; yet the contractors have shown every disposition to proceed, and have made an efficient commencement.

Hereto annexed, will be found the reports of Mr. A. R. Parker, engineer upon that part of the Northern Cross railroad situated between the Illinois and Mississippi rivers; to which I refer for all further particulars upon said works.

At the meeting of the Board in June last, it was ordered, upon the petition of various citizens of Morgan county, that a lateral branch of the Northern Cross railroad be constructed from a point near the Illinois bluff to the town of Naples, in said county, upon condition that the Naples and Jacksonville Railroad Company would relinquish the charter granted them at the last general session of the Legislature of this State.

In pursuance of this order of the Board, I proceeded to cause a survey and location of said road.

It was then found that the company had done a large amount of work upon the road, and that they had a right by law to construct the road upon almost the same route for many miles then occupied by the Northern Cross railroad, and that the construction of the last mentioned road was in violation of the charter of that company, and that said charter was believed not to be within the provision of the internal improvement law in relation to relinquishing charters; and under all those circumstances it became necessary that some compromise should be made, to avoid a collision between the State and the company, and a probable delay of the whole work. It was ascertained also that the company had located said road upon the most direct route from the town of Naples towards Jacksonville, and that the work was done upon said direct route, and that the same would intersect the Northern Cross railroad, in the most advantageous and beneficial manner for the benefit of the State and the use of said branch; yet it was ascertained that a route might be had from said town of Naples to the Northern Cross road by a shorter line than the one adopted by the company; yet that line would be much more circuitous, and less useful as a road from Jacksonville to Naples, than the one adopted by the company. It was also found that as the company was by law entitled to a full compensation for work done upon their road, which must be paid for and lost to the State, and that the right of way upon their route would cost nothing, and the right of way upon the shorter route would cost a large sum of money, and their route would be cheaper to the State than the one referred to as the shorter branch; consequently, the route that was found to be the most direct, and, all other circumstances considered, the cheapest was adopted. (The communication from the President of said Railroad Company heretofore referred to, is annexed as a part of this report.)

After this branch was located, I proceeded to advertise and let the same to efficient and responsible contractors, according to the orders of the Board, upon terms highly advantageous to the State, as will be seen by reference to said contract now on file in the proper office. The charter of the company has been relinquished; the right of way over a large amount of land has been secured for the Northern Cross railroad. A

lot for an engine house and a lot for depot buildings, at Naples, have been granted free of charge; for the particulars of which, reference is made to said contract on file in the proper office.

After said work was put under contract, the persons engaged thereon proceeded with all possible despatch towards its final completion, and said road, together with a building for a depot, is now in a great state of forwardness.

That part of the Northern Cross railroad between the Illinois and Sangamon rivers, it will be remembered, was under contract previous to my last report. Since that time the contractors upon that road, although much delayed by an unusually sickly season, have progressed speedily. All the grading, except about one-half mile between the Illinois river and Jacksonville, is completed. Several miles from Meredosia towards Jacksonville are already completed, and a locomotive of the first order is in successful operation thereon. All the grading between Springfield and Jacksonville, except about eight miles, is done, and a large amount of timber is already furnished upon the road; and it is confidently believed that, with proper diligence on the part of the officers of the State, and proper encouragement to contractors, said road may be completed and the cars running to Springfield on the fifteenth of September next.

Mr. Bucklin, chief engineer, has submitted to me an abstract of all the estimates made for contractors upon the Northern Cross railroad, within the first judicial circuit. This abstract shows the total amount of work done, the amount and prices paid therefor, and the work to be done upon each of the divisions of said road, and by each contractor; which is hereunto annexed, as a part of this report.

That part of the Pekin and Bloomington branch of the Central railroad, situated between Pekin and Tremont, was under contract previous to my last report in June. The grading upon this part of the road was originally let to various contractors, but, by sub-contracts made since, the whole of that work has fallen into the hands of two very enterprising and efficient contractors; and it is expected that said road will be completed by the last of October, in 1839. While upon the subject of this road, it becomes my duty to state that much difficulty is likely to arise in finding suitable rock for bridges and culverts conveniently situated to this line, as well as the whole line of the Central railroad from Bloomington south to the north fork of the Sangamon river. These lines pass over a high and gently rolling country, and their great elevation above the common strata of limestone. None of this article appears even in the deepest valleys of the streams. I would therefore suggest the propriety of adopting either wood or brick for the first construction of the bridges and culverts, which will answer for some years, and until their places can be supplied by a more durable material transported upon the road.

That part of the Northern Cross railroad within the first judicial circuit, situated east of Decatur, has been surveyed and located by the engineer of the eastern district, under the immediate control of the Commissioner of the fourth judicial circuit; and as no report has been made to me in relation to said survey, I cannot render any information to the Board in relation thereto.

That part of the Central railroad, situated in the first judicial circuit, north of Bloomington, has been surveyed and located by General Ran-

som, whose report to me in relation thereto will be found hereunto annexed, to which I refer, as giving all the necessary information.

On the 11th day of August, 1837, having learned that the Fund Commissioners were about to go to the Eastern States, upon the business of this State connected with their duties as Fund Commissioners, I sought and obtained the aid of those gentlemen in purchasing iron, a locomotive, cars, and other necessary articles for the roads in my circuit. At that time I made and delivered to them a letter of authority; a copy of which I hereto annex as a part of this report. Those gentlemen proceeded to purchase railroad iron, cars, a locomotive, and various other articles necessary for the road, a part of which has been received, and the cost of transportation paid by me; but as those gentlemen have not rendered to me any account or statement of the cost, quantities or description of the articles purchased, it is impossible for me to give the necessary information in relation thereto. It is not precisely understood by me, whether those gentlemen, in the purchase of all those articles, acted by virtue of their offices as Fund Commissioners, or under the letter of authority from me. But be that as it may, I have no doubt but all the necessary information in relation to the whole subject, may be had by reference to their report when made, and to the books and records of their office.

The iron received is a good article of the kind, except that the spikes were not of the proper kind, and were made of very bad iron, and consequently was of little value to the contractors. The locomotive received is of the first order; but is heavier than is necessary for the light grades upon the Northern Cross railroad, and is better suited to the Pekin and Bloomington branch of the Central railroad; for which road I understand it was intended: but notwithstanding its weight, it is in successful operation without doing the least injury to the road, or at all deranging its structure.

The next subject about which it becomes necessary for me to report to the Board, is that connected with the improvement of the navigation of the Illinois river.

It will be remembered that all of this river, from its mouth up to the junction with the Sangamon river, was placed under my immediate direction and control. From that time up to the first day of September last, the waters continued so high that it was impracticable to make any satisfactory survey or examination of the channel. About that time the waters fell, and presented a favorable opportunity to examine the obstructions to the navigation. The country along the river, and indeed in the interior to a great extent, then became so sickly that hands could not be procured to make the necessary survey and examinations of said river. With a view, however, of making this survey, I conditionally procured a small steamboat for this service. This boat was found not to answer the purpose, and the money intended to be paid therefor was applied to other parts of the public works, without cost to the State.

Being disappointed in this, I endeavored to procure the necessary information in a different way. I employed skilful persons, and those well informed as to the obstructions to the navigation, to proceed to ex-

amine all the bars, at the lowest water, and then examine and ascertain the depth of water, and the extent and character of the obstructions. The information thus acquired will be found in a statement and description of the obstruction to the navigation of the Illinois river, below the mouth of the Sangamon river, hereto annexed.

It is not pretended that the information thus acquired is entirely correct, but is sufficiently so to enable the Board to determine the probable cost of removing the obstructions, and making the river navigable for steamboats at all stages of water. The material composing all the bars mentioned in this statement is sand and clay, and of such a texture as to be easily removed by a steam dredging machine properly constructed. I would therefore suggest to the Board the propriety of purchasing a machine of that kind for this service, and that the same may be immediately put into operation upon this river. I would further suggest the propriety of employing one competent engineer, experienced in this kind of improvement, to whose charge the whole work upon this stream should be committed.

It is ascertained that this river is one of the most valuable streams for navigation of all the tributaries of the Mississippi, and it is believed that no other improvement would add more value to the country, or confer more general benefits, than the improvement of its navigation. It is therefore very desirable that this should receive the immediate attention of the Board.

The next subject of inquiry for the Board to make of me, as one of its members, is, as to the amount of money expended by me, as Commissioner, upon all and each of the of the public works under my charge. It will be remembered that the appropriations made by the law, in relation to internal improvements, are all special, and only applicable to certain specific objects; yet the same law requires the Board to purchase land for the use of the State, and not necessary to any particular road, and to do other acts and make other expenditures not applicable to any particular portion or division of the improvements of the State. Under these circumstances, the Board of Public Works and the Board of Fund Commissioners constituted a general fund, to be used upon objects not confined to any particular works. Upon this fund I made several drafts; and the money thus drawn was applied to various objects not particularly applicable to any one road.

Out of this fund, all the property was purchased to accommodate the locating parties, and, generally, to carry on the various duties connected with the engineering necessary upon the various works under my charge.

Since the meeting of the Board of Public Works, on the first Monday in this month, I have been requested by the Board of Fund Commissioners to divide and appropriate this fund among the different works and appropriations. In performing this service, I have adopted the rule of dividing this fund, pro rata, between the works, according to the extent of the appropriations, except that the amount paid for property now on hand for the use of the different roads, was charged to the Northern Cross railroad, and, consequently, the proceeds arising from the sale of land property, (if it should become necessary to sell it) should be returned to that appropriation, and a proper allowance made out of the other appropriations to supply the loss consequent upon the use of this property.

The total amount of money expended by me since the commencement of my services, upon all the various roads and parts of the public works under my charge, up to the first Monday of this month, is \$230,148 75. The total amount drawn is \$229,395 45.

Of the sums thus expended, \$19,930 77 has been expended upon the Bloomington and Pekin railroad.

Upon the Alton and Shelbyville railroad, the sum of \$4,535 79.

Upon the Central railroad, the sum of \$3,550 67½.

Upon the Illinois river, the sum of \$100 00.

The residue of said sum, amounting to \$202,031 51½, has been expended upon the Northern Cross railroad. In addition to the sum of money expended by me upon the Northern Cross railroad, as aforesaid, there has been paid to the contractors, by special drafts drawn by me for work done upon said road, the sum of \$263,625 33.

There has also been paid, by a special draft drawn by me in favor of John J. Hardin, Esq., for and in consideration of a judgment rendered for the right of way for said road over a tract of land, the sum of \$2,166 00; making the total amount paid upon this road from the commencement of operations upon the public works, up to the first Monday in this month, the sum of \$467,822 84.

In addition to the sum before stated as having been paid upon the Pekin and Bloomington railroad out of money drawn by me, there has been paid by special drafts upon the Fund Commissioners, in favor of contractors, for work done upon said road, the sum of \$18,092 00, making the whole sum expended upon that road - \$38,022 77.

Upon the Alton and Shelbyville railroad, the sum of 4,535 79

Upon the Central railroad - - - 3,550 67

Upon the Illinois river - - - 100 00

In conclusion, I would say to the Board that the average cost of the several roads in the first circuit must necessarily be greater than the same extent of road further in the interior. This is owing to the fact, that these lines pass through the undulating surface bordering upon the Illinois river, and owing to the fact, too, that the law expressly requires the roads to be located to certain towns and places; to arrive at which it becomes necessary to make deep cuts, raise heavy embankments, and construct costly viaducts; all of which could have been avoided, if the points to which the roads were expressly made to pass had been less in number or differently situated.

All of which is respectfully submitted.

M. McCONNEL, *Com'r.*

Copy of a letter of authority given to the Fund Commissioners to purchase iron.

JACKSONVILLE, Aug. 11, 1837.

MESSRS. MATHER, RAWLINGS, and OAKLEY,
Fund Commissioners of the State of Illinois.

GENTLEMEN: There is now in this district nearly fifty-eight miles of railroad under contract, which will require about sixty-two miles of railroad iron. It is also my intention to put under contract this season that part of the Pekin and Bloomington branch of the Central railroad situated between Pekin, on the Illinois river, and Tremont, probably about ten miles. For this route the iron may be required, (or, at any rate, a part of it,) the coming season; say eleven miles of iron.

In all contracts made and to be made, the State has and will reserve the right to furnish the iron. The kind of iron wanted is of that width and thickness that requires twenty-two tons to the mile, including plates, bolts, and all other things necessary.

You are authorized and requested to furnish the funds and purchase this iron, or to procure it to be imported to the port of New Orleans, subject to the order of M. McConnel, Commissioner of the Board of Public Works of the State of Illinois. It will be necessary to secure the duties upon this iron at New Orleans, to be returned when the iron is laid. If you should believe that iron will decline in price, so that the same may be bought next year for less than at present, you may contract for the delivery of thirty miles, say, six hundred and sixty tons, or thereabouts, as we may not want to use more than that quantity in this district through the next season. In all this you will exercise your discretion.

You will also contract for the building of one locomotive, of the most approved plan, and a suitable number of passenger and burthen cars, to be shipped, *via* New Orleans, to the house of McConnel, Ormsbee. & Co., Naples, Illinois. You, or either of you, are hereby authorized, either by yourselves or agents, to enter into all contracts, and to make all provisions necessary for the procuring of the iron, cars, &c., aforesaid, in as full and complete a manner as I could myself do, as a member of the Board of Public Works for the first judicial circuit; and the funds expended shall be receipted for as expended by me for the use and purposes aforesaid.

With much respect,

I remain, yours, &c.

M. McCONNEL,

*Commissioner of the Board of Public Works for the first
judicial circuit of the State of Illinois.*

RAILROAD OFFICE, *Manville, Dec. 3, 1838.*

To M. McCONNELL, *Commissioner*
of the Board of Public Works.

SIR: Agreeably to your instructions, I have caused the party engaged in locating the Central railroad from the Illinois river, south, to continue the location of the same as far as Bloomington. The results thus obtained are, I take great pleasure in saying, in all respects as favorable as you had reason to anticipate from the remarks on the preliminary reconnaissance, which I had the honor of communicating to you last summer.

From that survey it was ascertained that a tangent was practicable between the head waters of Cedar creek and the ford-way at the Mackinaw, near Hudson, a distance of about 43 miles. The location has been made along this tangent, which it may be remarked, is nearly on the right line between Bloomington and the termination of the Michigan and Illinois canal, and from one-half to one and a half miles east of the line of exploration. Almost the whole extent of this line is along the Grand prairie, without an obstacle of any kind worthy of notice, except at the Panther, Mackinaw, and Sugar creeks; and those, it will be seen, are easily surmounted. The soil is mostly a rich vegetable mould, varying from one and a half to three feet, with a substratum of compound clay, presenting a surface uncommonly free from undulation, ridges, or objectionable grades in either direction.

From the north line of McLean county to the north branch of Panther creek, a distance of twenty-six and a quarter miles, an almost level prairie is passed over. The distance between this and the south branch is two and a quarter miles, with a continuation in the character of the surface. The valleys of each of these branches are gentle depressions into the surface of the prairie of about thirty feet, and extending about a mile on either side of each stream. The former is somewhat the largest, and will require a bridge of thirty-three feet span and sixteen feet in height, with grades on either side, of nineteen feet per mile, for a short distance. The latter requires a bridge of thirty feet span and twenty feet high, with a bank of about twelve feet in height for eight hundred feet, and grades on either side, not exceeding fifteen feet per mile, for one mile each way. From this stream to Mackinaw creek, a distance of seven miles, a very even though gradual ascending surface intervenes.

Mackinaw creek has here a narrow valley about eighty feet below the general surface of the prairie, with steep irregular bluffs on either side. Our line strikes this creek twenty-six hundred feet above the ford-way, near Hudson, at a point where the bluffs on either side approach unusually near for this stream. These bluffs are composed of a coarse firm sand, of a suitable character to form substantial embankments. A bridge of one hundred feet span and thirty-three feet high, with an embankment on the south side, four hundred feet long and thirty feet high, will give grades on each side, of nearly fifty feet per mile, for a mile each way from the bridge.

This being very much the steepest grade between Cedar creek and Bloomington, it may be preferable to add a few feet to the height of the bridges and embankment, and thus reduce the declivity in the immediate vicinity of this creek. The surface is somewhat broken and irregular, though with the grade mentioned there will be no cuts required that exceed seventeen feet, and these but for a short distance.

The line passes through the principal street in the village of Hudson, which is at an elevation above the Illinois river, at La Salle, of 310 feet, and 51 miles distant from that place. One mile from Hudson we pass the Six-mile creek, a stream of about the same size of the north branch of the Panther creek. The valley is also about the same width and depth, and will consequently require a bridge of the same dimensions as the last stream. A distance of four and a half miles from Hudson we attain the greatest elevation on the line, it being four hundred and fourteen feet above the Illinois and the summit between Six-mile and Sugar creeks.

The grade in ascending to this point will require to be about thirty-two feet per mile, for three and a half miles: the southern declivity from this summit is more abrupt, and requires a grade of about thirty-nine feet per mile for one and a half miles. From Six-mile creek to Bloomington the prairie is much more undulating than that north of Mackinaw creek, though no very deep cuts or heavy embankments will be necessary. The only obstacle remaining to be noticed is Sugar-creek, near Bloomington. This is a small stream situated in a valley similar to the south branch of Panther creek. A bridge of thirty feet span and twenty-nine in height, with an embankment nineteen feet high for about one thousand feet will give a grade on either side, of twenty-five feet per mile, for a short distance. The line between Hudson and Bloomington is a tangent, and is believed to be the most favorable location attainable between these places; it terminates in the latter place at a point about twelve hundred feet east of the court-house. As was indicated in my former communication, the character of the surface here will admit of such a change in the line as will best suit its continuation to Decatur, and other purposes at this point.

Stone for bridges and culverts can be obtained at Sandy and Panther creeks, though of rather inferior quality. Timber suitable for the superstructure of the road and in sufficient abundance can be obtained on most of the streams traversed by this line. The lively interest manifested in the progress of this work by the inhabitants along the line seems to offer the best guarantee of its ultimate usefulness to them, and incidentally of its importance to the interests of the State. Indeed the necessity of a more facile and speedy communication to the market, to accommodate the wants and requirements of this healthy and fertile portion of the State, is becoming every day more apparent; and it can hardly be doubted that its great agricultural advantages, in connection with the facilities that will be afforded by this railroad, will very soon draw within its bosom a very dense and wealthy population. A simple inspection of the physical features of this portion of the United States must lead to the conviction that this railroad would be the most convenient and speedy channel of communication for the inhabitants of this region with the distant markets. Recent experience has demonstrated that railroads, as a channel of communication, can be depended upon at all times and at all seasons even in latitudes more rigorous than ours. More than two years since it was computed by an engineer of high standing that, when the railroads which were then projected and in progress were completed, a traveller would be enabled to pass from New York or Boston to Chicago in the space of sixty-one and a quarter hours. Subsequently several important and extensive works have been commenced on this line of communication, shortening the distance materially, and substituting railroads where one or

two changes to steamboats were requisite; by means of which even this estimate must be very much reduced, so much so that it admits of no doubt that, when those works are completed, the journey will be made from Bloomington to Boston, or New York, and back, in a little more than half of the time that is now required to descend the river from Peoria to New Orleans.

I cannot conclude these remarks without expressing my belief that, from the character of the soil and surface over which most of this road passes, the plan of forming a road-bed, on which to place the superstructure, (as is already adopted in some places in the State) is attended with a useless expense of time and money.

When a country is very broken, and the soil is of a nature to make durable and substantial road-ways, this practice may be necessary; but when the soil is a mass of decayed vegetation, and the surface in a great measure already graded by the hand of nature, the circumstances of the case are entirely changed, and their necessity no longer exists. In all high latitudes, whatever may be the soil or surface, it will be admitted that the formation of permanent railroad superstructures should be below the action of the frost. Accordingly these foundations are constructed either upon rubble stones, stone blocks, gravels, piles, or blocks of wood, extending a suitable distance below the surface.

From the difficulty and expense of obtaining other materials, one of the two last methods seems to have the strongest claims to be adopted on the prairies. Over such a surface as these present, I cannot doubt that it will be a great saving of expense to neglect grading or making a road-bed altogether, except over sharp ridges and deep valleys. Upon this plan, the road must be graded upon piles firmly driven into the earth, at a suitable distance from each other, and extending from a few inches to ten feet above the surface, as the case may require. Cross-ties are placed upon the tops of these piles, and a longitudinal rail secured on these, capped with the flat rail of wrought iron; or if the H rail is used, the longitudinal rail of wood becomes unnecessary. A similar superstructure is sometimes placed upon the ends of wooden blocks, planted firmly below the action of the frost. Each of these plans have already passed the ordeal of experience in the Eastern States; and they are found to have every necessary degree of firmness and strength, are more durable than superstructures that are at or upon the surface, and the aggregate expense is moreover evidently much less than with a graded road-bed, since, with this, the same or greater expense for superstructure seems necessary.

The principal advantages of this plan are, to obviate the expense of grading the road-bed and excavating drains and ditches—the necessity of placing the grade line, generally, above the surface, to avoid the water, partially melted snows, and ice, that frequently cover the more level portions of the prairies to a depth of some inches. This alone will amount to a very considerable sum.

Culverts, drains and walls to protect the embankments, will also be unnecessary, as the water will pass freely under the superstructure at all points, except at ridges, and here they are not required—from the difficulty of procuring stone on the prairies. This will also be a very important item in the expense.

The expense of excavating block pits, or driving piles through the embankments, will also be saved. The aggregate of these expenses will ordinarily amount to a sum varying from one-third to one-half of the whole expense of said road; and this amount, it will be seen, must be expended from one to two years before any advantage can be derived from its use; but, upon the plan proposed, as soon as the superstructure is laid, cars may be put in motion, and a benefit realized from the money expended. Should it be determined, ultimately, to form a road-bed and construct culverts and bridges, with stone walls and abutments, it will be seen that this work will be greatly facilitated, and the expense very much reduced, by means of the superstructure already in position; and this may be delayed to such a time as the finances of the State would best permit more expensive structures, or its interests require them. Upon this plan, sharp ridges will of course be excavated, and deep ravines either embanked, or truss work raised to support the rails, as the case may require. Truss bridges, also, to pass the different streams, when durable stone is not easily procured, would not only be a great saving of expense in the first cost, but a work of economy, with a view of ultimately building more permanent structures.

I have thus, sir, in a very hurried and desultory manner, made known to you the principal facts, as well as my views in relation to the work you have placed under my charge will admit of. The accuracy of the latter, I hope more fully to demonstrate when time permits me to present estimates upon different parts of the work.

For the particular distances, elevation, &c., I beg leave to refer you to the accompanying tables. As the field operations have but just been completed, I am not able at this time to exhibit the necessary maps, profiles, and plans pertaining to the work; they are however in progress, and will be transmitted, in due time, by

Your obedient servant,

T. B. RANSOM, *Engineer.*

Table showing the courses, distances, curves, and radii, of the line of the Central railroad, from Baly's point to Bloomington.

No. of stations.	Tangent or curve.	Course.	Distance.	Radius.	Remarks.
End of division—					
To 2,259	Tangent	S. 12° 15' E.	166,920 ft.	—	Tangent course, 50 ² , in division No. 1.
2,259 to 2,292	Curve	—	4,200	22,918.368 ft.	To get on best course for crossing Mackinaw.
2,292 to 2,606	Tangent	S. 22° 45' E.	31,400	—	Line across Mackinaw.
2,606 to 2,674	Curve	—	6,800	22,918.368 ft.	Between Mackinaw creek and Hudson.
2,674 to 3,166	Tangent	S. 6° 15' E.	49,200	—	End of survey, Bloomington.

Table showing the elevation of different points, and the intermediate distances on the Central railr'd between Baly's point & Bloomington.

Location.	No. of Stations.	Distance from Ills. river.	Elevation.	Remarks.
Summit between the heads of the Big Vermilion and Crow creek	Sta. Feet.			
Bed of north arm of Panther creek	1,592	159,200	301.676	
Bed of south arm "	1,983 10	198,310	223.571	
Deep ravine	2,117 20	211,720	226.976	In Clark's grove
High water mark of Mackinaw	2,473	247,300	231.745	Bank on either side about 255,000
Top bank of river—north side	—	—	205.214	Spring of 1838.
Surface of the water	2,490 70	24,970	207.214	Water in river 70 ft. across in direct line, about 8 in November 23, 1838. [depth.
Top bank of river—south side	—	—	194,000	Timber on river 2 miles and 1200 feet across.
River bottom	2,492 90	249,220	240,000	About 300 feet across bottom.
Broadway street, Hudson	—	—	203,000	
Bed of Six-mile creek	2,702	270,200	310.614	Line crosses creek three times. Easily turned.
Summit between Six-mile and Sugar creeks	2,763 30	276,330	292,060	Highest ground.
Arm of Sugar creek	2,938	293,800	44.223	
2d arm of do.	3,064	306,400	314.059	
3d arm of do.	3,086 20	308,620	306.896	Wide ravine.
Bloomington	3,106 60	310,660	303.448	Creek about 5 across.
	3,164	316,400	368.461	

Report of James M. Bucklin, Principal Engineer of the Western District.

VANDALIA, Dec. 22, 1838.

TO M. McCONNEL, *Acting Commissioner
of the First Judicial Circuit.*

SIR: I have been desirous of laying before you this winter an estimate of the probable cost of the different lines of road included within the limits of this district, and am enabled to do so through the exertions of Mr. Pollock, my principal assistant, and the gentlemen associated with him. They have, under very discouraging circumstances, completed the preliminary examinations; and to the accompanying report of Mr. Pollock I refer you for a description of them in detail. The estimates deduced from these surveys are designed as approximations; yet, upon a more careful and deliberate examination and a definitive location, many important improvements, conducive to economy and useful effect, which were observed to be practicable during the course of the field operations, can be adopted, and the cost thereby materially lessened. It is remarkable that the different routes examined have not proved more unfavorable, and, indeed, impracticable, within the limits of an ordinary expenditure, taking into consideration the numerous points to which the location of the roads are restricted, without regard to the topographical features of the country, and especially on the lines running at right angles with the direction of the streams.

Could a greater latitude have been allowed in the location between extreme points, the extraordinary advantages afforded by the topographical character of the State, for the economical construction of railroads, would have been rendered available to a much greater extent, and the roads rendered more perfect and effective. The survey of the Pekin and Bloomington branch of the Central railroad under contract between Pekin and Tremont, nine and a half miles, at \$9,192 per mile, has been extended to Bloomington, a distance of thirty-six and a half miles. The average cost per mile is estimated at \$11,736. The construction of the Peoria and Mackinaw branch and of the Pekin and Bloomington branch of the Central railroad, is impracticable at the maximum rate of graduation fixed by the Board of Public Works. With a grade of 70 feet per mile, however, Peoria can be connected with the Pekin branch within 4.81 miles of Mackinaw, a distance of fifteen miles, at a cost of \$8,217 per mile.

The country between Bloomington and Decatur on the route of the Central railroad has been explored; the distance found to be forty-six miles, and the probable cost \$14,645 per mile. The crossing of Salt creek renders the graduation of this part of the Central railroad very expensive; several cross sections which were taken off the valley of the stream exhibited a difference of \$50,000 in the cost of graduation. A more critical examination is necessary to ascertain the minimum cost of this division of the road, and, before it can be properly determined, the result of the examinations north and south of the western engineering district should be known; for if it is found necessary to employ gradients of more than forty feet to the mile in the graduation of other portions of this road, the same increase in the maximum rate of graduation should be made between this part of it included within the western district; in which event the cost of graduation would be lessened without detracting from the efficiency of the motive power.

The first and second divisions of the Northern Cross railroad, when completed to Springfield, a distance of fifty-six and three quarter miles, will cost \$624,250, or \$11,000 per mile. The probable cost of the third division is \$332,000; the average cost per mile of the three divisions of this road, viz: the first division, extending from Meredosia, on the Illinois river, to Jacksonville, 23.617 miles; second division, from Jacksonville to Springfield, 32.127 miles; and the third division, from Springfield to Decatur, 41½ miles, in all, 98.244 miles, will be \$9,750.

During the past season the graduation of the roads under contract in this district have advanced with great rapidity. Between the Illinois and Sangamon rivers, a distance of 63.137 miles, fifty-two and a quarter miles of the graduation of the Northern Cross railroad are completed. The unfinished portions will soon be finished, and large quantities of materials have been and are now being delivered upon the whole line. This work is in such a state of forwardness as to warrant the belief that a locomotive engine will reach Springfield, from the Illinois river, by September, 1839.

On the Pekin and Bloomington branch of the Central railroad, the graduation of that part under contract between Pekin and Tremont is nearly finished, and will probably be completed, and the road put in operation, the ensuing summer. In both of these roads it has been necessary to enlarge the cuts beyond the dimensions prescribed by law. About ten miles of superstructure has been laid on the first division, beginning at Meredosia. The law of internal improvement restricts the width of track to four feet eight inches between the rails. Obeying the spirit of this law rather than the letter, I have laid the track four feet nine inches, that being the general width of roads in the United States. It is worthy of serious inquiry, I think, whether it would not be expedient to increase the width of track still more; say to five feet. There is evidently an advantage in a wide track, laying aside its effects upon the movement of railroad wheels in curvatures: but these effects have been obviated to such a degree, by the proper application of the principle of the cone to the rims of the wheels, and the use of wheels of small diameter, with vibrating axles, that I cannot perceive any objection to the adoption of the five feet track in the construction of our roads, possessing, as they do, so large a proportion of straight line, and few curvatures as small even as fourteen hundred feet radii.

The spikes and connecting plates accompanying the iron purchased for the Northern Cross railroad, were found not to suit; and the expense of altering them has nearly equalled the original cost. Part of the spikes are of a quality not much better than the worst description of cut nails. This lot is now laid aside, as we have fortunately discovered another lot of much superior iron. They should be made of Juniata or Tennessee iron, as it is essential that the most tenacious iron be employed for that purpose. The definitive tracing of the curvatures and tangents on the graded surface, preparatory to laying down the superstructure, and the superintendence of this work, has been confided by me to Mr. George Plant, whose skill and experience, acquired on other roads in the same service, well qualifies him for that duty. I have not been disappointed in my expectations derived from his well known ability. The superstructure as far as it has been completed is as well and as substantially laid as it is possible for a road of this class to be made. It has remained in good adjustment, although heavy loads and an engine weighing ten tons have repeatedly passed over it. In the steepest grades its weight and strength are considerably increased. White oak timber is almost entirely employed; and the plate rail, two inches by one half inch, has consequently every advantage that it can possess to render it secure and immoveable. This description of rail will answer a very good purpose, but it would be better economy in the end to substitute the H rail for it.

The order of the Board of Public Works, requiring the change of the maximum grade on the Pekin and Bloomington branch of the Central railroad from fifty to seventy-five feet per mile, was carried into effect, and the cost of grading that part of it between Pekin and Tremont, a distance of 9.47 miles, reduced from \$100,297 to \$40,297, the average cost of the graduation being now \$4,192 per mile, instead of \$10,459.

Your instructions of the 16th June, 1838, respecting the location and prepar-

ation for contract of the Naples branch of the Northern Cross railroad, accompanied with an order of the Board, requiring this branch to be located and put under contract, were obeyed, but in pursuance of subsequent instructions received from you, the route designated by you was prepared for contract.

The location of the second division of the Cross railroad, between Jacksonville and Springfield, has been revised and improved, and the distance found to be thirty-three miles and six hundred and seventy feet, which is a little less than by the original location.

In arranging the grades of the roads under construction, great care has been taken in the prairies to elevate the road-bed one or two feet above the surface, and at the same time drain it effectually by means of longitudinal and lateral ditches. In these level plains, which are sometimes saturated with water for weeks together to a considerable depth, I am satisfied, from my own experience, and from the results of experiments which have been made in the construction of other roads in the United States, that the adoption of an effectual system of drainage, from the foundation of the superstructure, is the only means by which its durable and permanent adjustment can be secured without incurring great expense.

In my last report I remarked that it was designed to pass the Sangamon river on a bridge of three hundred feet in length, two spans of one hundred and fifty feet each; since which I have had an opportunity to observe the effects of the stream when high, and have no reason to believe that any greater extent of span is necessary to discharge its waters; but, upon mature deliberation, I have determined to shorten the span of the arches to one hundred feet each, and to place another bridge of one hundred feet span in the bottom between the river and the bluff. The strongest reasons operating in favor of the change are the necessity for shortening the spans of the bridge, produced by want of height in the abutments, and the fact that, whatever may be the peculiar advantages of the mode of constructing a wooden bridge, it is continually operated upon by causes affecting its permanency and durability, the effect of which increases in a ratio with the length of the span and the changes which are produced. The draining of the bottom above the embankment is another inducement; but the shortening of the span, I consider of the greatest importance, affecting the durability and consequent value of the work. By placing more piers in the main channel, the superstructure might have been simplified in its construction, and lessened in its cost; but the foundation of the piers, and the increased quantity of masonry required, would greatly enhance the cost of the bridge; and the obstruction of the piers to the passage of ice and drift would endanger its safety. The present arrangement seems to me to be a proper medium between the objections arising from the adoption of long or short spans at this particular point. Mr. Grubb, the contractor, has laid the foundation of the pier, and delivered a large proportion of the stone required. It will be nearly completed during the ensuing season.

The plan of this bridge and of all important structures of this kind, in the western district, are from the designs of J. & W. Madison, superintendents of carpentry on the Cumberland road. For bridges requiring extraordinary strength, I know of no plan combining so many advantages.

Respectfully, your ob't servant,

J. M. BUCKLIN.

NORTHERN CROSS RAILROAD.

SECOND DIVISION.

Table of Grades from Meredosia to Sangamon river—Continued.

Stations from	to	Grade per 100 feet.	Grade per mile.		Total.	Total height above the Illinois riv.	Length of plane.	Length of divi- sion.
		<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Miles.</i>
0	2	-	-	Level	-	163.403	200	
2	38	.50	26.400	Ascent	18.00	181.403	3,600	
38	69	.625	32.900	Descent	19.375	162.028	3,100	
69	73	-	-	Level	-	162.028	400	
73	102.5	.625	32.900	Ascent	18.439	180.467	2,950	
102.5	135	-	-	Level	-	180.467	3,250	
135	164	.625	32.900	Ascent	18.125	198.592	2,900	
164	178	.400	21.120	"	5.600	204.192	1,400	
178	200	-	-	Level	-	204.192	2,200	
200	209	.320	16.890	Descent	2.880	201.312	900	
209	246	.350	20.064	Ascent	14.060	215.372	3,700	
246	256	-	-	Level	-	215.372	1,000	
256	276	.400	21.120	Ascent	8.000	223.372	2,000	
276	305	.700	36.960	Descent	20.300	203.072	2,900	
305	308	-	-	Level	-	203.072	300	
308	330	.140	7.392	Ascent	3.080	206.152	2,200	
330	340	.200	10.560	"	2.000	208.152	1,000	
340	353	-	-	Level	-	208.152	1,300	
353	370	.650	34.320	Ascent	11.050	219.202	1,700	
370	430	.150	7.920	"	9.000	228.202	6,000	
430	441	.300	15.840	Descent	3.300	224.902	1,100	
441	451	.160	8.448	Ascent	1.600	226.502	1,000	
451	463.5	.700	36.960	Descent	8.750	217.752	1,250	
463.5	466	-	-	Level	-	217.752	250	
466	490	.700	36.960	Ascent	16.800	234.552	2,400	
490	520	-	-	Level	-	234.552	3,000	
520	535	.400	21.120	Descent	6.000	228.552	1,500	
535	540	-	-	Level	-	228.552	500	
540	560	.500	26.400	Ascent	10.000	238.552	2,000	
560	622	-	-	Level	-	238.552	6,200	
622	642	.350	18.480	Descent	7.000	231.552	2,000	
642	676	-	-	Level	-	231.552	3,400	
676	689	.600	31.680	Descent	7.800	223.752	1,300	
689	699	-	-	Level	-	223.752	1,000	
699	711	.600	31.680	Ascent	7.200	230.952	1,200	
711	780	-	-	Level	-	230.952	6,900	
780	807	.100	5.280	Ascent	2.700	233.652	2,700	
807	827	.300	15.840	Descent	6.000	227.652	2,000	
827	858	.300	10.560	Ascent	6.200	233.852	3,100	
858	930	.180	9.504	Descent	12.960	220.892	7,200	
930	1210	.059	3.115	"	16.429	204.316	27,847	
1210	1260	.300	15.840	"	15.000	189.316	5,000	
1260	1295	.225	11.880	Ascent	8.875	197.191	3,500	
1295	1316	.218	11.510	"	4.578	192.613	2,100	
1316	1346	-	-	Level	-	192.613	3,000	
1346	1367	.250	13.200	Descent	5.250	187.363	2,100	
1367	1386	.300	15.840	"	5.700	181.663	1,900	
1386	1406	-	-	Level	-	181.663	2,000	
1406	1456	.040	2.112	Ascent	2.000	183.663	500	
1456	1486	.076	4.012	Descent	2.280	181.383	3,000	
1486	1506	.214	11.299	Ascent	4.280	185.663	2,000	

Copy of a report from Mr. Parker.

WESTERN DIVISION, NORTHERN CROSS RAILROAD,
Illinois, August 11, 1838.

TO MURRAY MCCONNELL, Esq.
Commissioner Board of Public Works.

SIR: In conformity with the 12th section of the Internal Improvement law, I have the honor to present to you, and to the Board of Public Works, the following report.

In a communication from you, dated 11th June last, informing me that the three miles of the Northern Cross railroad, running west from the Illinois river, were ordered to be put under contract, I was instructed to locate the same and prepare it for contractors by the 13th of the present month.

The reconnoissance of the country last fall being more general in its character, and indefinite as to the most feasible route for the location, I deemed it highly important to enter upon a re-examination of the country at the points in the route presenting the most serious obstacles. Accordingly, an engineering corps was organized, and placed under the direction of Mr. Egbert Dewey, assistant engineer, who proceeded, with instructions, to the place designated for the commencement of our field operations.

The principal difficulties to be overcome were either by ascending from the bottom to the table lands above, through short and abrupt ravines, and consequently by adopting steep grades, or traversing the valley of a winding stream, with lower grades and short radii of curvature. After patient investigation of this matter, and expeditious experiment, dictated by a desire to consult the "most rigid economy" in a close comparison of the cost of construction, as well as the vertical and horizontal direction of the different trial lines, I was enabled to decide to my entire satisfaction upon the one combining the most desirable advantages. I am also satisfied, after comparing opinions with those who had more immediately the direction of the original examination, that theirs agree with mine in every important particular relating to the location.

A report having been submitted by Mr. H. P. Woodworth, including the western division of the Northern Cross railroad, it was my province, here, to make reference to that report for a description of the original surveys, and proceed to consider the more recent explanations and amendments.

First. As one of the prominent objections to the route first examined was between the town of Versailles and Mount Sterling, about two miles from the former place, the review was commenced near Versailles and run in a northwesterly direction, varying in all places when it was thought advisable, in order to make any easy graduation with less expense. Along this line, the country, for a short distance is considerably undulating, presenting, perhaps, more prominent features than any other section on this route; but on entering into a geological examination of it, there were found no material objections, it being formed of a loose earth and easily removed.

Second. A line was run from the northern or Camp creek route, commencing at a point near the mill of Cornelius Vandeventer, esq. ascending the bluff through a small ravine, and intersecting the first named or central line one mile northwest of Versailles. This was found much too steep and winding to admit of the location for a useful line of road.

Third. A route was examined diverging from the Camp creek line, about four miles further north, up said creek, and intersecting the central line on the ridge two and a half miles northwest of Versailles; this line was also found objectionable on account of its windings, linear extent, and abrupt gradients.

Many other lines were carefully and instrumentally examined, which presented insurmountable difficulties; and at length a re-examination was instituted along the original survey of Camp creek, with a view, if possible, of cutting the points of the hills, and thereby diminishing the resistance which would be caused by the abruptness of the curves. This, however, was attended with but little success, as the line was frequently interrupted by bold and rocky prominences in the windings of the valley, and by constant changes of direction.

Independent of the objections offered to this line on account of its serpentine course, it was found two and three-fourth miles farther in its linear extent than any other line examined. It was also found subject to inundation at high stages of water, and that it would be necessary to raise an embankment on the creek bottom for nearly the whole extent of the route, and (where it would not exceed the expense of making new channels for the stream) it would require many small bridges or extensive culverts.

Bearing in mind some of the main objects of the proposed work, I deemed it my duty, so far as practicable, to make a choice for the location of the road which would be the most economical in its construction and embrace the advantages of speedy conveyance, the accommodation of the inhabitants, and the general development of the resources of the country along the route: also, taking into consideration its prospective usefulness, it was my wish to determine upon a route, the graduation of which could be arranged with a view to accommodate an increase of trade and an easy transportation. Accordingly, a line was commenced on the bank, at a point opposite the termination of the road on the eastern side of the Illinois river, and run across the river bottom, north, about 62° west, to the mouth of a ravine near Mr. Henry Hambaugh's residence; thence up this ravine to Versailles, situated on the south half of section seventeen, in township two south, and in range two west; making an extent of line from the river bank to Versailles of 6.50 miles. From this place the line passes in a northwesterly direction over some of the breaks or undulations, first above noticed, at the heads of the small streams running into Camp creek on the northeast, and M'Kee's creek on the southwest, for about two miles; thence, by passing along on the ridge dividing the waters of the above mentioned streams, with easy grades and slight curves, it reaches Mt. Sterling, pleasantly situated on an eminence in the prairie, 15.89 miles from the Illinois river, on the northeast quarter of section seventeen, in township one

south of the base line, and in range three west of the fourth principal meridian.

In making a selection for this division of the road, I am fully convinced, by various researches and personal observation, that a more direct and more eligible route could not have been chosen between the two points.

As to the general features of the country along this line, there is nothing peculiarly striking in its topography, or remarkably interesting in its geological formation. The undulating timber lands on the river bluffs, the extended bottom and prairie lands on the margin of the Illinois and in the interior, and its peculiar adaptation to agriculture, together with the good quality and great quantity of material, such as rock and timber, situated immediately on the route, were important considerations in making a selection, and are valuable inducements for the future progress of this line of the public improvement.

The climate is healthful; the inhabitants are already numerous and increasing. A desire for improvement seems to be awakened in the vicinity of the work, and new signs of enterprise are daily visible in the cultivation of the soil and in the abundant increase of agricultural products.

The lands in the vicinity of the road are estimated at great value; notwithstanding which, I can cheerfully acknowledge the liberality of the inhabitants in throwing open their fields, and relinquishing to the State, free of cost, a sufficient quantity for the construction and future use of the road.

The inhabitants of Mt. Sterling and Versailles, flourishing villages in the interior, affording to the adjacent population their necessary supplies of merchandize, anticipated the extension of this railroad as forming a connecting link between the Mississippi and Illinois rivers; and that its intersection with other portions of the public works would greatly facilitate the interchange of commodities and the communication by travelling. It was ascertained by observations at the bluff, and on the river bank by marks on the trees and otherwise, that the water from the Illinois river, at its highest stage, inundated the bottom to a considerable depth, and that it would be necessary to raise the road-bed to the average height of about seven feet across the bottom. After estimating various plans for the substructure of this part of the road, it was thought best and cheapest to throw up an embankment, above high water mark, with broad slopes and a sufficient number of sluices bound by protection walls. This, well lined with brush, confined by the earth-work, will protect the embankment from washing, and give vegetation a chance to take root, which will soon form a protection to the slopes. In crossing the bottom at right angles with the line of the river bank, it will be necessary to adopt a level grade, in order to preserve uniformity of road-bed above the water level.

This line from the river bank, being horizontally and vertically of one direction, will form a beautiful as well as useful portion of the road, and when completed as it is contemplated, I hesitate not to say, will be as durable as any portion of the work. As the resistance in the transit of the line through the river bluffs will be the greatest in this division, and indeed will require the extent of the power necessary between Quincy and the Illinois river, it is well to remark that the maximum

grade will be 70 feet to the mile, the minimum radius of curvatures, 1,142 feet.

The present graduation of this work, from the bluffs to Mt. Sterling, was surveyed in great haste, and it is not improbable that it may be much improved. The operations of the field have been hurried, in order to perform its duties or make the necessary examinations before the time appointed for the letting to contractors; and it gives me much pleasure publicly to bear testimony to the fidelity and industry with which the duties of the field have been discharged.

An exhibit of quantities and the cost of construction, together with a table of grades and curves upon the whole line, are hereto annexed; also, detailed drawings of the formation of the road-bed, masonry, &c., with written specifications, in which the same are to be executed, accompanying the maps herewith returned. All are most respectfully submitted by

Your obedient servant,
AMASA R. PARKER, *Resident Engineer.*

An exhibit of the cost of grading so much of the Northern Cross railroad as lies between the Illinois river and Mt. Sterling, in Schuyler county, it being divided into fifteen sections, as follows:

Section No. 50, 63,755 cubic yards embankment, at 18 cts	\$11,475 90
49, 81,835 cubic yards embankment, at 17 cts	13,911 95
48, 52,293 cubic yards embankment, at 18 cts	9,412 74
Grubbing and clearing on river bank	150 00
Total	<u>34,950 59</u>

August 15, 1838. The contract price for the above three sections will exceed \$40,000.

Section No. 47—5,300 feet.

16,560 cubic yards embankment, at 15 cents	\$2,484 00
1,652 cubic yards excavation, at 14 cents	231 28
83 cubic yards masonry in culverts, at \$4 50	373 50
Grubbing and clearing	250 00
Total	<u>3,338 78</u>

Section No. 46—4,700 feet.

46,695 cubic yards embankment, at 15 cents	\$7,004 25
1,722 cubic yards excavation, at 14 cents	241 08
151 cubic yards masonry in culverts, at \$4 00	604 00
Grubbing and clearing	250 00
Total	<u>8,099 33</u>

Section No. 45—6,100 feet.

37,392 cubic yards embankment, at 15 cents	-	\$5,608 80
76,125 cubic yards excavation, at 14 cents	-	10,657 50
171 cubic yards masonry in culverts, at \$3 50	-	598 50
Grubbing and clearing	-	200 00
Total	-	<u>17,064 80</u>

Section No. 44—5,400 feet.

30,031 cubic yards embankment, at 15 cents	-	\$4,504 65
23,158 cubic yards excavation, at 13 cents	-	3,010 54
232 cubic yards masonry in culverts, at \$3 50	-	812 00
Grubbing and clearing	-	250 00
Total	-	<u>8,577 19</u>

Section No. 43—4,900 feet.

49,173 cubic yards embankment, at 15 cents	-	\$7,375 95
42,848 cubic yards excavation, at 14 cents	-	5,998 72
190 cubic yards masonry in culverts, at \$4 00	-	760 00
Grubbing and clearing	-	150 00
Total	-	<u>14,284 67</u>

Section No. 42—4,700 feet.

19,876 cubic yards embankment, at 14 cents	-	\$2,782 64
21,138 cubic yards excavation, at 14 cents	-	2,959 32
75 cubic yards masonry in stone drains, \$4 00	-	175 50
Grubbing and clearing	-	150 00
Total	-	<u>6,191 96</u>

Section No. 41—6,000 feet.

12,066 cubic yards embankment, at 15 cents	-	\$1,800 90
289 cubic yards excavation, at 14 cents	-	40 46
39 cubic yards masonry in stone drains, at \$4 50	-	175 50
Grubbing and clearing	-	250 00
Total	-	<u>2,266 86</u>

Section No. 40—5,000 feet.

8,602 cubic yards embankment, at 16 cents	-	\$1,376 32
513 cubic yards excavation, at 14 cents	-	71 82
14 cubic yards masonry in stone drains, at \$4 50	-	63 00
Grubbing and clearing	-	250 00
Total	-	<u>1,761 14</u>

Section No. 39—5,600 feet.

8,604 cubic yards embankment, at 15 cents	-	\$1,290 60
681 cubic yards excavation, at 15 cents	-	102 15
44 cubic yards masonry in stone drains, at \$4 50		198 00
Grubbing and clearing	-	300 00
Total	-	<u>1,890 75</u>

Section No. 38—5,200 feet.

2,726 cubic yards embankment, at 16 cents	-	\$436 16
5,567 cubic yards excavation, at 14 cents	-	779 38
14 cubic yards masonry in stone drains, at \$4 50		63 00
Grubbing and clearing	-	250 00
Total	-	<u>1,528 54</u>

Section No. 37—5,200 feet.

5,751 cubic yards embankment, at 15 cents	-	\$862 65
2,582 cubic yards excavation, at 14 cents	-	361 48
47 cubic yards masonry in stone drains, at \$4 50		211 50
Grubbing and clearing	-	150 00
Total	-	<u>1,585 63</u>

Section No. 36—4,500 feet.

3,384 cubic yards embankment, at 14 cents	-	\$473 76
4,434 cubic yards excavation, at 14 cents	-	620 76
29 cubic yards masonry in stone drains, at \$4 00		116 00
Total	-	<u>1,210 52</u>

Making the average cost per mile, from Illinois river to Mt. Sterling, \$6,472 67; or from the river bluffs to Mt. Sterling, \$5,710 20.

A Table of Grades.

No. of grades.	Direction.	Inclination	Elevation or	Elevation	Length of	Distance		Localities.
		per mile.	depression.	above Illinois		from Illinois	river.	
		<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Miles.</i>	<i>Feet.</i>	
1	Level	-	-	16.20	20,400	3	4,560	River bottom.
2	Ascending	51.82	52.03	68.22	5,300	4	4,580	River bluff.
3	"	70.00	114.01	182.23	8,600	6	2,620	Versailles.
4	"	3.75	4.77	187.00	6,700	7	4,040	
5	"	33.79	16.00	203.00	2,500	8	1,260	
6	Descending	15.60	6.50	196.50	2,200	8	3,460	
7	Ascending	39.60	31.50	228.00	4,200	9	2,380	Heads of Camp and
8	"	3.16	.36	228.36	600	9	2,980	M'Kee's creeks.
9	"	18.48	17.50	248.50	5,000	11	1,820	
10	"	11.88	900	257.50	4,000	12	540	
11	"	1.55	100	258.50	3,400	12	3,940	
12	"	18.23	1450	273.00	4,200	13	2,680	
13	Descending	3.10	200	271.00	3,400	14	980	
14	Ascending	5.94	10.125	281.125	900	15	4,700	Mt. Sterling.

Copy of a communication from the President of the Jacksonville and Naples Railroad Company.

To MURRAY McCONNEL, Esq.,
Commissioner, &c.

JACKSONVILLE, July 24, 1838.

DEAR SIR: Since the meeting of the Commissioners of the Board of Public Works at Vandalia, when they ordered a construction of a lateral road to the town of Naples from the main line of the Northern Cross railroad, I have learned that the engineers in your employ have surveyed several lines passing in different directions from said main line to the town of Naples and Columbus; from which I infer that said engineers are seeking for the shortest and cheapest route from any part of said road to the town of Naples, in the same manner and upon the same principles that they would do if the Naples and Jacksonville Railroad Company did not exist, and had not constructed a road, under their chartered rights, for nearly four miles. Under present circumstances, I deem it my duty, on behalf of said Railroad Company, to inform you that there exists a chartered grant from the Legislature of the State, to the Naples and Jacksonville Railroad Company, to make a railroad from the Illinois river at Naples, through Wolf run, to the town of Jacksonville; that said company have expended nearly twenty thousand dollars in the construction of a part of said road. No part of the chartered rights of said company has been surrendered to the State; and by reference to the internal improvement law upon that subject, it is not made your duty to attempt to procure a surrender of the charter of said company to the State, nor would said company, in justice to itself, have granted your request had you so attempted. You will see that, under the circumstances surrounding this case, it becomes important that the State should pursue a course not inconsistent

with our rights and interests acquired from the State, as well upon principles of justice to us as of economy on its part. I hold that the law is well settled that the State cannot make a road over our chartered route without our consent, or upon any principle, ancient or modern, without, at least, paying all damages that may arise from such an act. It is equally true that the State cannot construct a road from Meredosja to Jacksonville, though it should avoid the immediate route named in our charter, and thereby render our chartered rights of no avail, without the consent of the company, or the payment of damages as aforesaid. All these questions have been fully settled by the Supreme Court of the United States, and by other high judicial tribunals of the country.

I contend, in behalf of the company, and we shall put ourselves in this legal position, that, in any event, whether a lateral branch be made by the State to Naples or not, the State must pay for our road and all damages, or abandon making a road on this route itself.

The question then presents itself to you and your engineers, whether it would be best for the State to pay for the work we have already done, and throw it away, or, having paid for it, to use it for the purposes and benefit of the State. There is one other fact which I deem it my duty to make known, and at this stage of the proceedings, and that is, that the State is already occupying more than fifteen miles of the route expressly named in our charter, and above seven miles of the private landed property of the stockholders of said company.

Having communicated these facts and intimated our intentions, and referred to the principles of law that govern the matter, we leave the question with you and your engineers, not doubting that you will see what is the interest of the State, and, seeing it, will not fail to act accordingly.

Now, we propose to surrender all our rights as a chartered company, if the State will take and complete our road, and pay us for the work done at what it is worth. In addition to the general principles of law that govern in this case, it is expressly provided in our charter that the State shall not take away our chartered privileges without first paying all costs and expenses, interest, and damages.

I am, very respectfully, yours, &c.

MIRON LESLIE,

President of the Naples and Jacksonville Railroad Company.

A statement and description of the obstructions to the navigation of the Illinois river below the mouth of the Sangamon river; and amount of cubic yards of excavation in each bar, from the mouth of the Illinois river to the mouth of the Sangamon river.

The first bar in the Illinois river, being six miles from the mouth of the river, is called Six-mile bar. When the Illinois and Mississippi rivers are both low, the water is twenty-eight inches deep in the channel. To cut a channel through this bar one hundred and fifty feet wide, so as to make it contain four feet water in depth at its lowest stage, it will be necessary to excavate 1,371 cubic yards of earth from the bottom of the river.

French bar is twenty-four miles from the mouth of the river, is one hundred and fifty feet wide, has twenty-eight inches of water upon it at the lowest stage; and will require, to make the proposed channel one hundred and fifty feet wide, 1,371 cubic yards excavation.

Hurricane Island bar is thirty miles from the mouth of the river, is one thousand three hundred and twenty feet wide, and has thirty-nine inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 7,332 cubic yards excavation.

Apple Creek bar is forty-two miles from the mouth of the river, is three hundred feet wide, and has twenty-seven inches of water at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide, 3,333 cubic yards excavation.

Otwell bar is forty-five miles from the mouth of the river, is two thousand six hundred and forty feet wide, and has but two feet water upon it at the lowest stage, and is considered one of the worst bars in the river; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 31,556 cubic yards excavation.

Steward's Point bar is forty-eight miles from the mouth of the river, is four hundred and fifty feet wide, and has twenty-eight inches water upon it at the lowest stage; and will require, to make the channel one hundred and fifty feet wide and four feet deep, 3,333 cubic yards excavation.

Grand Pass bar is forty-nine miles from the mouth of the river, and is four hundred and fifty feet wide, and has thirty inches water upon it at the lowest stage; and will require, to make the channel one hundred and fifty feet wide and four feet deep, 3,794 cubic yards excavation.

Cooper's Island bar is fifty-one miles from the mouth of the river, and is six hundred feet wide, and has thirty inches water upon it at the lowest stage; and will require, to make the channel one hundred and fifty feet wide and four feet deep, 6,666 cubic yards excavation.

Bridgeport bar is fifty-two and a half miles from the mouth, and is one hundred and fifty feet wide, has three and a half feet water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 416 cubic yards excavation.

Little Blue bar is fifty-eight and a half miles above the mouth of the river, is sixty feet wide, and has thirty inches water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 167 cubic yards excavation.

Berington's bar is sixty-two miles above the mouth of the river, is three hundred feet wide, and has twenty-four inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 6,666 cubic yards excavation.

Big Blue bar is sixty-three miles above the mouth of the river, is sixty feet wide, and has twenty-four inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 666 cubic yards excavation.

Naples flats are sixty-eight miles from the mouth of the river, have about thirty inches of water upon the bar at the lowest stage. They extend two miles in length, and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 29,333 cubic yards excavation.

McGee's Creek bar is seventy miles above the mouth of the river, is six hundred feet wide, and has thirty-three inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 1,667 cubic yards excavation.

Meredosia bar is seventy-three and a half miles above the mouth of the river, is six hundred feet wide, and has thirty inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 1,667 cubic yards excavation.

Moore's bar is eighty miles above the mouth of the river, is four hundred and fifty feet wide, and has twenty-eight inches water at the lowest stage; and will require, to make the channel one hundred and fifty feet wide and four feet deep, 5,000 cubic yards excavation.

Beardstown bar is ninety-two and a half miles above the mouth of the river, and is commonly called "Crooked Creek bar," is four hundred and fifty feet wide, and has fifteen inches of water upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 7,500 cubic yards excavation.

Sugar Creek bar is one hundred and one miles above the mouth of the river, is three hundred feet wide, and has twenty-eight inches upon it at the lowest stage; and will require, to make the proper channel one hundred and fifty feet wide and four feet deep, 6,666 cubic yards excavation.

Total amount of excavation upon the several bars from the mouth of the Illinois river to the mouth of the Sangamon river, a distance of one hundred and one miles.

	Cubic y'ds excava.
Six-mile Island bar	1,371
French bar	1,371
Hurricane Island bar	7,332
Apple Creek bar	3,333
Otwell bar	31,556
Steward's Point bar	3,333
Grand Pass bar	3,794
Cooper's Island bar	6,666
Bridgeport bar	416
Little Blue bar	167
Berington bar	6,666
Big Blue bar	666
Naples Flats bar	29,333
McGee's Creek bar	1,667
Meredosia bar	1,667
Moore's bar	5,000
Beardstown bar	7,500
Sugar Creek bar	6,666
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Total amount of cubic yards of excavation necessary to remove all the bars	118,504
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118,504 cubic yards, at 50 cents per yard	\$59,252 00
Contingencies, ten per cent	6,825 00
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Total amount	66,077 00
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Report of A. R. Parker, R. E.

WESTERN DIVISION, NORTHERN CROSS RAILROAD,
Illinois, November 30, 1838.

TO MURRAY M'CONNEL, ESQ.,
Commissioner of the Board of Public Works.

SIR: In compliance with your instructions for me to furnish the Board of Public Works with a map and profile of the western division of the Northern Cross railroad, accompanied by a brief statement of the progress of the work, and the amount of money expended in the execution of the same, the following is respectfully submitted.

Those portions of the improvement lying between Quincy and Columbus, and also upon the Illinois bottom, have been under successful operation since they were respectively placed under contract; and the workmanship of the same evidences, most substantially, the ability and skill of the contractors. The work has been under the immediate direction of the assistant engineers, Mr. James Oakey, at Quincy, and Mr. Egbert Dewey, at Versailles, who have, from time, received and executed my instructions.

The whole amount of money estimated to be paid to contractors during the progress of grading the Quincy division, as reported at this date, is \$24,661 46. Reference being made to tables exhibiting, in detail, the quantities and amount of work to be done, it is thought unnecessary to embody them in this report.

The Illinois bottom being subjected annually to inundation by the high stages of water in the river, and as there is a prospect of being compelled soon to abandon operations upon the river bank, in consequence of a wet season, I would respectfully recommend that the Board of Public Works take into consideration the expediency of ordering so much of the road to be placed immediately under contract as will include the heavy work in the Illinois bluffs. This, if awarded to the contractors who are now engaged at the river, would enable them to retain their present force during the high stages of water in the winter and spring.

For a general description of the character of the work between the bluffs and Mt. Sterling, reference is made to my former report on the location.

There being much anxiety and speculation in relation to the cost of the whole work between the Illinois river and Quincy, a few words may suffice to give some desired information upon this subject. As the cost has been estimated and reported, and reference made to these reports for that kind of information, I will merely state that the average cost, per mile, for grading 54 miles, will probably not exceed \$4,300.

This line passing, as it does, over a level prairie, for nearly thirty miles, can be graded at a trifling expense. Some slight variations in the horizontal and vertical position of the present line may much diminish the cost of grading.

At the close of the report, above presented, it may not be inappropriate to detail some of the advantages arising to the country, and to take a single glance at the position it will occupy in the final establishment of of railway communication.

All classes of society are measureably affected in establishing a means of conveyance throughout the country, which is of the kind so economical in its construction, and which, when once established, will be so easy, safe, and expeditious. It is an improvement furnishing a facility for the introduction of all kinds of produce from distant sections of the country, which never before found way to market on account of the difficult means for the transportation, and for bringing immediately into cultivation the vast extent of prairie in the vicinity of the road, which, on account of its remote situation and want of proper communication, has been long neglected. The inhabitants settling in the interior are induced to retire to the groves and forests, leaving the wide field of enterprise unoccupied and unimproved. Therefore, the slightest inducement for the settlement of so extensive a territory, of the richest soil, is entitled to consideration.

The increase of travel, both westwardly and eastwardly, within the last few years, has maintained a line of coaches through the neighborhood of the road, and has greatly augmented the profits to the proprietors. The great delay of merchandize, as well as passengers, on account of the low stage of water in the navigable streams, costing both time and money; has reduced the country to actual want; and all due consideration should be given to any plan which proposes a remedy for a tried grievance. The object here contemplated may be urged for the establishment of any portion of the proposed improvement. The facility of moving with great rapidity from one section to another, shows how the energies of a country may be concentrated. Distance may be properly estimated by the time required in traversing it; and the time spent by men of business, in travelling from one place to another, is lost, because it is turned to no profitable account. Thus, Jacksonville may be said to be twenty-four hours from Quincy, or Quincy thirty hours from Springfield; but as twenty miles an hour have been found attainable, (and indeed sixty miles an hour have already been performed on a portion of this road,) Jacksonville would be only four hours from Quincy, or Quincy six hours from Springfield. So, on a moderate calculation, what is now considered two long days' journey, (the time not unfrequently spent in performing it,) may be converted into a pleasant mornings' excursion; and the citizen may perform a journey to either of the above places, transact his business, and return the same day, without consuming more than one-fourth the time usually spent by the ordinary mode of travelling.

The importance, to a commercial town, of an easy, safe and expeditious mode of transit for merchandize, will be readily acknowledged.

The minimum amount of goods sold in the town of Quincy, during the year ending 30th November, 1838, is \$289,000; most of which have been transported from the eastern market, via New Orleans, or the Ohio river, subjected to great delays and much risk. These, according to the statements of the merchants themselves, have not satisfied the demands of the country. The low stage of water, and the delays incidental to river navigation, presented a serious obstacle to the progress of trade. This town affords many other sources of trade and profit. The lumbering establishments, which were not extensive enough to supply the town and surrounding country, average a sale of \$102,000 annually. These,

however, have furnished material for the erection of some extensive warehouses, as well as many of the first order of public and private dwellings. There is also an extensive flouring establishment which manufactures \$60,000 worth of flour annually; seven eighths of the wheat thus manufactured is transported from the country by private conveyances. In speaking of the mercantile, mechanical, and other business transactions of this enterprising town, I believe I can add, without exaggeration, that Quincy is one of the most pleasant towns on the banks of the Mississippi; and, according to the recent numerical estimate, is unequalled in increase of population by any other in the State, while, in beauty of location, it surpasses any other in the west. The surrounding country, including the ground upon which the town stands, is of an undulating surface, of the richest and most productive soil. The streets cross at right angles. In the centre is a public square, surrounded by the Quincy house, the court house, and many other public buildings, exhibiting some of the best specimens of modern architecture. This town being at the western termination of this important thoroughfare may, as also for its commercial advantages, be considered one of importance.

Amongst the widely diffused benefits to be derived from the improvements at large, must be enumerated, in no inconsiderable degree, the commercial prosperity of the western country. The energies of that class of people that are settling upon her lands, rearing her country villages, and taking a prominent stand in her trade and manufactures, will be invigorated; while every article in her agricultural industry will experience an increased demand, from the cheapness and facility with which it will be introduced into market. The inhabitants at large will reap their share of direct and immediate benefit. The hidden resources of the country will be developed. Coal having been discovered nearly in the direct line of the railroad, having no other access to market than by private conveyance, may soon be afforded in great abundance, at reduced prices.

The public mind seems to be emerging from embarrassments in relation to the utility of the proposed work, and confidence maintained, from a more thorough knowledge of the demands of the country. The march of improvement and the tide of emigration are unceasing, and seem to be irresistible, affording new and increasing encouragement for the construction of roads and canals, and for the enlargement of the channels of navigation. The prospects of the country brighten as the light of the morning successfully unfolds its beauty, and as science and the arts, and the theatre of mechanical invention, assume a place in the great valley of the west.

Nearly two centuries have elapsed since the first partial invention of railroads. The plan first adopted was a simple construction of wood, at a trifling investment of capital and a much less expenditure of scientific arrangement. The plan was gradually improved, until, finally, the substitution of iron for wood was found preferable, being both more useful and economical. The form and size of the rail, for a long time, remained objectionable, until the edge rail was finally adopted, to answer the design.

The first successful application to Parliament, for the establishment of a railroad upon a more extensive scale, was made in the year 1823. The subscribers to this undertaking encountered a long and strenuous opposition. The land-holders whose property was affected, and the coal proprietors whose pecuniary interests were concerned, repeatedly placed their injunction upon its passage. This road was twenty miles long, consisting of a single track, with *sidings*, to admit cars to pass one another. This work afforded a large profit, and was principally used in conveyance of coal. Thus, by repeated applications of steam motive power to railway carriages, the public mind became confirmed in the belief of its adaptation to the principle of conveyance.

Some of the most enterprising men having witnessed the powers of the locomotive engine, and conceiving that it might be successfully employed on a railway for commercial purposes, took measures for its establishment as a means of transportation between Liverpool and Manchester. A survey was prosecuted, and a guarantee offered for the estimated cost of the work. Public announcement was made of the objects of the scheme, and the nature of the undertaking; and petitions, the most supplicatory, were signed for the sanction of the legislature. Session after session was exhausted in scrutinizing and discussing the merits of the bill. Favors were asked and refused—repeated, and rejected. The opposers of the measure appeared determined, at all hazards, to put down so intolerable an innovation on “established modes and vested rights.” Some, whose estates the road crossed, contended that the sanctity of their domains would be invaded, and the privacy of their residences destroyed, by thus bringing into their neighborhood a public highway, with all the varied traffic of coals and merchandize. But in looking at the immense trade which would be created between the two towns, in consequence of the undertaking, the proprietors were resolved to renew the overture. The importance of the work seemed to them self-evident, and, for the interest of the country, imperiously required. After four years of conflict and contention, the heat of parties exhausted itself, and the bill was passed. Doubtless the history of this stupendous work is better known by those who, perchance, may read this article, than so concise a view can disclose. It is an enduring example of human perseverance, ingenuity, and enterprize. This work, costing as it did, together with its appendages, the sum of £800,000, for a line of only thirty-one miles, might seem an unwarrantable expenditure; but the immense traffic created in consequence of its construction justifies the outlay. “If we look for the construction of one hundred railroads equal in extent to the Liverpool and Manchester, comprising a line of three thousand miles, in various situations, and absorbing a capital of fifty or sixty millions of pounds sterling, what a source of occupation to the laboring community; what a change in the facility of giving employment to capital, and consequently to the value of money!”

Reverting again to our own country, where industry “in its varied channels of business and enterprise,” and where health and prosperity are so signally prevalent, when contrasted in its natural resources with those of foreign countries, we can but hope for it a future happy destiny: and to the west we not only look as to the great natural granary of the union, and the establishment of internal communication of paramount

importance, as the means of affording the facility of intercourse and conveyance; but in a neglect of the same as the neglect of a bold and judicious application of mechanical science, and the abandonment of her career of improvement as a rejection of the means of aggrandizement, which other nations have successfully adopted.

But the spirit of the times and the progress of events seem to demand new energies in all the departments of business. We look forward to the approach of the period when the calculations of the merchant, or the speculation of the political economist, shall be deemed more consistent with science, literature, and the arts—and all shall be enlisted to cultivate the highest state of wealth and civilization—the improvement and well being of the whole community.

Statistics for the Quincy and Columbus division of the Northern Cross Railroad.

Quantities for the first six sections from the Mississippi—

138,323	cubic yards of earth removed, at 14½ cents	\$20,121 12
442.34	cubic yards excavation in culvert pits and ditches	61 73
1,141.268	cubic yards of masonry	2,732 85
	Grubbing and clearing	450 00
	Contingencies	148 97
		<hr/>
		23,514 67
	Deduct fifteen per cent. discount	3,527 20
	Total amount paid to Mr. T. Kelly, contractor, up to the last of November, 1838,	<hr/> 19,987 47

Statistics for sections Nos. 17 and 18 of the Northern Cross Railroad.

Quantities for sections 17 and 18, near Columbus—

18,633	cubic yards of earth removed, at 16.6 cents per yard	\$3,100 54
222.67	cubic yards excavation from ditches and culverts	33 40
220	cubic yards of mucking	33 00
432.06	cubic yards of masonry	2,335 40
		<hr/>
		5,502 34
	Deduct fifteen per cent. discount	828 35
	Total amount paid to the contractors, Messrs. Hendrickson and M'Farland, up to the last of Nov. 1838	<hr/> 4,673 99

	The total amount of money that will probably be required for the next six months on Mr. Kelly's contract, is	\$20,000 00
	On the contract of Messrs. M'Farland and Hendrickson	7,000 00
	Total amount of money required for the next six months	<hr/> \$27,000 00

JAMES OAKEY, *Civil Engineer.*

QUINCY, Nov. 27, 1838.

Report of William Pollock.

ENGINEER'S OFFICE,
Jacksonville, Nov. 24, 1838.

TO JAMES M. BUCKLIN, Esq.,
Chief Engineer of the Western District.

SIR: With a view of fulfilling your instructions of August, 1837, in relation to the survey of the Pekin and Bloomington branch of the Central railroad, and completing the preliminary examinations and location of that portion of it between Tremont and the latter place, (which had been left unfinished last season,) I resumed field operations in April last. Under subsequent instructions, however, it became necessary, in the first place, to revise the location between Pekin and Tremont, for the purpose of altering the maximum grade from fifty feet per mile, as first introduced, to seventy-five feet, as authorized by the Board of Public Works at their session in December, 1837.

To effect this object, a resurvey was commenced at Pekin on the 19th of April, and such changes made in the lateral position of the line as were deemed necessary, economical, and consistent with the vertical alteration—in all cases tending to make the line more direct. The most material alteration in the lateral position of the line took place in Tremont; not on account of any alteration in the vertical position of the line in pursuance of the instructions above alluded to—because the grade was comparatively moderate in the first instance at this place, and there was no necessity for increasing it; but, from further examinations of the country immediately east of the town, it became evident that the most judicious location would be effected by running the line a little obliquely through the town, cutting across the southwest corner of the public square, instead of passing by the way of Park street through the centre of the square, as first located; thus securing a greater length of straight line contiguous to the town, modifying the grade, passing over ground presenting more uniformity of surface, and, consequently, less expensive. It was at first thought to be objectionable to locate the road diagonally through the town, on account of cutting across lots, and thus giving the owners of them a plea for damages. But the road on this route will occupy the lowest ground in the town—it will pass through a ravine and approach nearer the centre of the town than before. The ground along this ravine is wet, and not considered very valuable at present, on that account. The making of the road will have the effect to drain off the water, reclaim and add value to the land; at the same time render the town an essential service in that particular. Moreover, it affords much better satisfaction to the inhabitants of the place, generally, than the former location.

After making some additional examinations between Tremont and Mackinaw, the line of location was established without varying materially from the route spoken of in my report of last year; except, between the crossing of the Mackinaw river and the town of Mackinaw, the line is now run more direct. Its greatest variation from a straight line between the two towns, is about $1\frac{1}{2}$ miles to the south, and is the only feasible route within that distance. The country in a direct line is considerably broken by the passage of Prairie and Mud creeks; but the valley of the Mackinaw river is the grand difficulty. We find there an immense chasm about one hundred feet in depth, near three-fourths of a mile wide, in the bottom, and the town of Mackinaw situated immediately on the top of the eastern bluff, at the distance of near a third of a mile from its base. A direct line would cross it nearly at right angles, and would require an immense embankment in order to reach the level of the town at a grade of 75 feet per mile. It is important that that level should be attained, to render it convenient for the transaction of business on the road at that place, and that the greatest benefit resulting from the road might be conferred on the town. It is also important and absolutely necessary, in order to continue the road eastwardly, the formation of the country not admitting of any modification of the grade for three-fourths of a mile east of the town.

The distance between Tremont and Mackinaw on the line of location, is a small fraction over seven miles, and as the obstacles which exist on a straight line are not entirely avoided, the construction of the road will still be found expensive on this line. The western bluff of the Mackinaw is reached at a distance of a little over two miles east of Tremont; and Prairie creek, which occurs about midway, is the only break of consequence within that distance. It will require an extent of near one thousand feet of embankment, averaging twelve feet in height.

In descending to the valley of the Mackinaw, the line passes obliquely along the side of the bluff, its favorable position at this place being such as to admit of it without varying the line materially from the desired direction. The bluff is much broken, and heavy excavations and embankments will be the consequence.

The valley of the Mackinaw on this route is wide, owing to the junction of the valley of Mud creek; and the line traversing it rather diagonally makes the distance between the bluffs near three miles. The line for this distance is direct, and continues so to the top of the eastern bluff, near the western boundary of Mackinaw, a distance of near four miles. It will be necessary, however, to introduce curves on either side of the river, in order to cross at right angles, or nearly so, instead of obliquely, as the line now runs.

The line between the bluffs is divided into three nearly equal parts by Mud creek and the river. The bluffs of the former being totally avoided, the passage of the stream itself will not be attended with any great expense. A spur of a ridge intervenes and forms an abrupt bank immediately on the west side of the river, which will occasion some heavy excavation in order to bring the road to a suitable level for the construction of a bridge across the river. Between the river and the eastern bluff, about a mile in distance, the line passes over a low prairie which is

subject to inundation; consequently, an embankment will be required the whole of that distance, averaging about five feet in height, in order to make the road secure. This is rather higher than would seem to be necessary, judging from the present indications of high water; but it must be considered that when this embankment is made, and the water, instead of flowing over the prairie, all turned into one channel, its tendency will be to rise something higher.

In approaching Mackinaw on this route, it is believed that the bluff's present less difficulty than at any other place that could be selected. The line reaches the foot of it at the distance of one mile from town, and offers comparatively a long gradual slope. A heavy and extensive embankment will nevertheless be required at the base, though not exceeding twenty-five feet in height; and in order to reach the level of the town, the grade of seventy-five feet per mile must commence one thousand five hundred feet west of the foot of the bluff. The embankment must of course be carried out from the foot that distance. It will also be required to be extended in the opposite direction nearly double that distance, making near three-fourths of a mile of heavy embankment, and amounting to near ninety thousand cubic yards. At the eastern extremity of this embankment a cut commences, but the quantity of excavation is small compared with the embankment; so that the materials for forming the latter will have to be procured chiefly without the limits of the road. The line passes angling through the southeast corner of the town; that is, the original town. Subsequent to the passage of the Internal Improvement law, the bounds of the town have been very liberally extended. The location is arranged so as to have six hundred feet of a level in the town of Mackinaw, for the purpose of rendering it convenient for the transaction of business connected with the road at that place. The space above mentioned is deemed sufficient for the purpose intended; yet a level of more extended limits would be desirable in passing through a town; and more especially when the grade immediately at either extremity of the level is seventy-five feet per mile, as in this case. But to extend this level even one hundred feet more, would be attended with serious additional expense in the construction of the road in the vicinity of the place. It would either cause the heavy embankment, mentioned as being necessary in ascending the bluff, to be raised 1.42 foot higher; or, in continuing eastwardly, to depress the road more below the surface of the ground than economy or utility would dictate. It was found necessary to adhere to the grade of seventy-five feet per mile for three-fourths of a mile east of Mackinaw; but from thence to Bloomington, the grades are more moderate. In making the examination between Mackinaw and Bloomington, three lines were projected; the first of which, in continuation from Mackinaw, passes along the summit of a ridge which divides the waters that empty into the Mackinaw river on the north from those of the same and those of Sugar creek on the south. This ridge was followed as far as the eastern side of Stout's grove, a distance of eight miles and a half, where it bears to the north entirely out of the desired direction, and leaves high undulating prairie for the remainder of the distance to Bloomington, except about half a mile of timber land in passing through the northern skirt of Dry grove, which occurs about two miles east of the grove first mentioned.

An alteration in the direction of this line was made immediately after passing the timber of Dry grove, and is the only interruption to a straight line between Stout's grove and a point near Bloomington. The first eight and a half miles of this route is nearly the same with the road now travelled between Mackinaw and Bloomington; it passes mostly through land thinly clothed with timber, except two miles through Stout's grove, which is heavily timbered. This part of the route presents a tolerably uniform surface, and would admit of the construction of the road at a moderate expense; but the remainder of the route to Bloomington is unfavorable on account of almost a continual succession of heavy cuts and fills, and abrupt grades. This line is north of a straight line between the two towns, and its greatest variation from it is seven-eighths of a mile, which occurs eight and a half miles east of Mackinaw. The distance by this line from Mackinaw to the court house in Bloomington, is 20.7 miles.

In continuing our examinations, the second line was run direct from Bloomington to Mackinaw, passing near the centre of the Twin grove, which is reached at the distance of four miles and a half west of Bloomington, and which is near one mile and three quarters across it; thence touching along the southern border of Dry grove and through the south end of Stout's grove; thence to Mackinaw through scattering timber, denominated barrens, and intersecting the former line a short distance east of the town. This line passes through considerable of cultivated land situated along the skirts of the timber, more perhaps than would be encountered on any other line that could be projected between the two towns; and, if the farmers should consider it a grievance, to have the road pass through their farms, this line would be objectionable in some measure on that account. The objections, however, that pertain to the first route, are not avoided on this; but are found to exist to such a degree as to make it necessary and important to seek a more favorable route. In the meantime, from observations extended further south, it became evident that a better route lay in that direction, except for the first mile and three quarters east of Mackinaw. The ridge before described is the most judicious route for that distance, and lies north of the straight line; accordingly, in continuing the line of location from Mackinaw, the ridge was adopted for that distance; thence, leaving the ridge to the north, the line coincides nearly with the straight line for the distance of about three quarters of a mile; thence, deflecting to the right, it was continued straight as far as the line between Tazewell and M'Lean counties, a distance of nearly three miles, reaching the prairie on Mr. Lindsey's farm, four miles from Mackinaw, passing through barrens chiefly all the way, and encountering rough, broken land between the ridge and that place. From Mr. Lindsey's to Bloomington we meet with no timber, except very little in passing the south end of Twin grove. From the county line to a point opposite this grove the line is direct, nine miles in distance; a slight curve then occurs, and the remainder of the distance to Bloomington is likewise direct, making nearly five miles and a half more. From Mr. Lindsey's eastwardly nine miles, the route is very favorable, the prairie being tolerably level. The most expensive point on this part of the route will be the crossing of a branch of Sugar creek, which

occurs opposite Stout's grove. It will require a bridge of twenty-five feet span, and an embankment of twelve hundred feet in length, averaging about ten feet in height. The last seven miles of the route will not be quite so favorable, on account of the prairie being broken and undulating, and requiring deep cutting and filling, and also abrupt grades as high as seventy feet per mile. The grades, however, could be modified on this part of the route, by increasing the cutting and filling, and thus adding to the expense. The curvature between Mackinaw and Bloomington is very trifling, as may already be inferred. The first mile and three quarters of the line next Mackinaw is chiefly curved, having a radius from 1,910 to 2,865 feet. The greatest departure of the location line from the straight line occurs at a point a little over five miles west of Bloomington.

The distance from Pekin to Tremont is 9.47 miles; from Tremont to Mackinaw, 7.15 miles; and from Mackinaw to Bloomington, 19.92 miles: making the whole distance, by the location line, 36.54 miles, terminating at Washington street in the western part of the town. By way of the straight line, the distance is 19.45 miles from Mackinaw to Bloomington, making a difference between the two of near half a mile only.

It is possible that a more suitable termination for this road in Bloomington will become apparent when all the necessary information is attained to determine on the location of the Central railroad through that place. The elevated situation of Bloomington and the rolling land immediately adjoining, will necessarily render the construction of both roads expensive at that place; and, in connecting them, it will require the exercise of considerable skill to accommodate the one to the other in such a manner as to effect the most judicious location.

SURVEY OF THE MACKINAW AND PEORIA BRANCH.

After having completed the survey from Pekin to Bloomington, and in pursuance of instructions, I proceeded to survey the route between Mackinaw and Peoria. Accordingly, on the 7th of July, at the surface of the water, on the east side of the Illinois river, opposite the foot of Fulton street in Peoria, we commenced a base line. In extending it eastwardly, we reached the bluffs at Farm creek, at the distance of one mile from the river; thence up the valley of said creek to station 103, nearly one mile further, where we left the valley of Farm creek to the north and continued up Epley's hollow, it affording a more favorable direction. But it was found that, in order to gain the table land at a grade of 75 feet per mile, it would incur the necessity of a cut at the head of the hollow of forty feet, and continuing for a long distance. It was therefore objectionable on that account, and also on account of the abrupt curvature which it would impose. Consequently, that route was abandoned, and the line continued up the valley of Farm creek as far as station 305, at the mouth of Roberts' hollow, making 5½ miles from the river; thence up said hollow, reaching the table land at the residence of Mr. Roberts, a distance of near three miles further; thence nearly direct to Mackinaw, making the whole distance 17.64 miles.

After leaving Mr. Roberts', there is no broken ground of any consequence met with until reaching the breaks of Mud creek, which occur on

the 14th mile from the river. They present no serious difficulty, however, and the route might be called favorable for 16 miles; but on the remainder of the route the bluffs and valleys of the Mackinaw occur, and present a very serious obstruction—in my opinion insurmountable, without transcending the bounds of justifiable expense.

To overcome these difficulties at a grade of 75 feet per mile, would require a cut on the west side of from twenty to fifty-five feet deep for the distance of near half a mile, and an embankment across the valley of from thirty to sixty feet in height and 3,600 feet in length; but to avoid deep cutting in the town, and to form a convenient connection with the other road, it would have to be raised still higher. A bridge of two hundred feet in length would be necessary to pass the water of the river, and the abutments at *this* place would have to be raised at least seventy-five feet above their foundation, which would be attended with enormous expense.

The cost of preparing the road on this first part of the route in a substantial manner for the reception of the rails, would amount to 205,000 dollars, at the most moderate calculation.

To avoid this heavy expense, a line was projected direct from station No. 455, at the head of Roberts' hollow, to a point in the line from Tremont to Mackinaw, intersecting it at the top of the western bluff, 2.13 miles east of Tremont; making the distance from the river at Peoria to this point, 16.08 miles; to which add the distance from this point to Mackinaw (4.81 miles) and it makes the whole distance 20.89 miles—3.25 miles further than by the first route. The distance from the head of Roberts' hollow to the intersection at the bluffs is 7.47 miles, all prairie except a portion of the last mile, and presents a favorable surface. The radius of curvature between [the river and this point will not be shorter than 1,432 feet, and the grade will not exceed 37 feet per mile, except in Roberts' hollow, where from 45 to 70 feet will have to be adopted. These grades conform very well to the natural slope of the hollows, and the foundation of the road will not be expensive. I am aware, however, that the Board of Public Works have not authorised the grade on this road to exceed 40 feet per mile; but if it is confined to that, I have only to state that this route is impracticable, and that no other can be found more favorable.

The Illinois river opposite Peoria presents a wide surface, it being more than half a mile at low water mark. In time of freshets, it spreads to the eastern bluff, making the width a little more than a mile and a half, and inundating the intermediate land to the depth of about sixteen feet next to the river, its depth gradually decreasing to the foot of the bluff. To raise the road above high water mark in this part of the route would require an embankment one mile long; and to have it sufficiently elevated above high water, it would be necessary to raise it about eighteen feet on the flat next the river.

Materials for the construction of this embankment would have to be taken chiefly from the bluff; and the heavy end of it being next the river and the most remote from the materials, its construction would be attended with much expense.

The mode of crossing the river, however, which is to be adopted must be considered, and the road adapted to it in such a manner as to be the

most convenient and economical. Owing to the vast expense that would be incurred in erecting a bridge at this place, and the inconvenience that the navigation of the river would sustain from it, I believe it is not contemplated at present; therefore, the only mode of crossing will be by means of a ferry. In that case, whilst an embankment carried across the low ground to the height above indicated might be convenient in time of high, it would be very inconvenient at a low, stage of the river, there being a difference of at least twenty feet between high and low water, which would make it necessary to introduce an inclined plane, with stationary power, in order to connect with the river in low water. But the plan which it is believed would unite economy with convenience in the best manner, is to raise the embankment only about two feet above the natural surface of the ground, and suffer the road to be immersed in time of high water, and during that time ferry all the way to the bluff.

In order to conduce to this arrangement, the earth for the formation of the embankment should be all taken from the upper side, and thus form a wide ditch that would admit of the passage of the ferry-boat during the partial immersion of the road. This part of the road will have a descent from the bluff to the river of seventeen feet per mile; and it will therefore be necessary to construct several turnouts between the bluff and the river, so as to connect with the boat at the various stages of high water.

Rock abounds in the bluffs of the Illinois river, but on the route of neither of the branches between the river and Mackinaw, after leaving the bluff, is there any discovered of a suitable quality for the construction of the necessary bridges and culverts. The same remark will also apply between Mackinaw and Bloomington. It will therefore be necessary to substitute some other material in lieu thereof. Brick, it is believed, would supply its place better than any thing else, and be nearly, if not quite, as durable for the numerous small culverts that will be necessary. It will be important that brick for this purpose should be manufactured in a superior manner to those commonly in use; hard burning in particular will be an essential and indispensable requisite. Good clay for the purpose of making brick can be found almost anywhere, and the neighboring groves of timber along the route would afford an abundance of fuel for the burning of them.

The prices charged at present through this part of the country, for finding all the materials and laying up brick wall, are from eight to ten dollars per thousand. Eleven hundred brick of the common dimensions, laid in mortar, will make two perches of 25 cubic feet each, which, at the rate of ten dollars per thousand, would be five dollars and fifty cents per perch. The competition that would be brought forth by the offer of large contracts for furnishing brick, would probably enable the State to procure them of a suitable quality at about the same price that is now paid for the common article; but to make a safe calculation, I shall estimate the cost of the brick work, per perch, at six dollars.

The alteration of the grade between Pekin and Tremont, and the work as now contracted for, will reduce the expense of grading that portion of the road about \$60,000; making \$40,297 instead of \$100,297, as first estimated; thus reducing the average cost per mile to 4,192 dollars instead of 10,457 dollars.

An approximate estimate of the cost of graduation between Tremont and Bloomington, and the branch to Peoria, gives the following result:

From Tremont to Mackinaw, 88,704 dollars, making an average cost per mile, in round numbers, 12,406 dollars.

Between Mackinaw and Bloomington, the location line, 78,157 dollars, averaging 3,924 dollars per mile; and the whole distance amounting to 166,861 dollars, averaging 6,164 dollars per mile.

By way of the straight line between the towns last mentioned, the cost amounts to 121,715 dollars, and the average per mile is 6,253 dollars; making a difference, in favor of the location line of 2,329 dollars per mile. The northern line between these two points also bearing an unfavorable comparison with the location line, I consider it unnecessary to present an estimate of the cost.

The whole amount from Pekin to Bloomington is 207,154 dollars, and the average per mile 5,670 dollars.

Between the river at Peoria and the intersection of the line at the Mackinaw bluff, the cost of grading will amount to 31,934 dollars, and average \$1,986 per mile. To estimate the whole distance to Mackinaw, the cost amounts to 108,268 dollars, and averages 5,183 dollars per mile.

The superstructure for the road, exclusive of iron, has been contracted for, at \$3,210 per mile. I shall assume that price as a fair criterion, and estimate the cost of one mile of the superstructure as follows:

Superstructure, exclusive of iron	-	-	\$3,210 00
22 tons of iron, at \$70 per ton	-	-	1,540 00
Spikes, plates, and nails	-	-	250 00
			\$5,000 00

	Distance in miles.	Cost of graduation.	Cost of superstructure.	Total.	Ten per cent. for contingencies.	Total cost.	Total cost per mile.
Pekin and Bloomington branch	36.54	\$207,154	\$189,854	\$389,854	\$38,985	\$428,839	\$11,736
Peoria branch	16.08	31,934	80,400	112,334	11,233	123,567	7,684

Table of Grades from Pekin to Bloomington.

No. of grades	Length in feet.	Activity per mile, in feet and decimals.	Declivity per mile, in feet and decimals.	Height above base, line in feet and dec.
Pekin	-	-	-	35.50
1	1,700	10.56	-	38.90
2	4,300	75.00	-	109.96
3	3,200	22.17	-	113.40
4	7,700	48.57	-	184.24
5	2,000	75.00	-	212.64
6	400	Level	-	212.64
7	2,300	-	19.04	209.99
8	1,500	-	Level	209.99
9	3,100	75.00	-	244.01
10	1,500	Level	-	244.01
11	2,000	36.96	-	258.01
12	300	Level	-	258.01
13	900	-	42.29	250.81
14	200	-	Level	250.81
15	1,000	63.36	-	262.81
16	1,200	10.56	-	265.21
17	1,700	5.28	-	282.21
18	500	Level	-	282.21
19	5,500	-	75.00	204.11
20	600	-	31.68	200.51
21	1,100	-	Level	200.51
22	1,200	33.26	-	208.07
23	3,590	Level	-	208.07
24	1,100	26.40	-	213.57
25	700	Level	-	213.57
26	2,000	29.04	-	224.57
27	210	15.855	-	230.87
28	1,400	Level	-	230.87
29	1,500	-	75.00	209.57
30	500	-	Level	209.57
31	1,000	75.00	-	223.77
32	2,900	20.064	-	234.79
33	500	Level	-	234.79
34	3,000	-	70.224	194.89
35	3,700	-	75.000	142.35
36	4,300	-	Level	142.35
37	2,400	52.80	-	166.35
38	800	Level	-	166.35
39	2,500	-	31.68	151.35
40	4,000	-	Level	151.35
41	6,700	75.000	-	246.49
42	600	Level	-	246.49
43	4,000	75.000	-	303.29
44	4,100	33.264	-	329.12
45	500	Level	-	329.12
46	2,000	-	10.56	325.12
47	100	-	Level	325.82
48	1,500	21.120	-	331.12
49	400	Level	-	331.12
50	1,800	-	21.12	323.92
51	400	-	Level	323.92
52	1,800	21.120	-	331.12
53	1,600	Level	-	331.12
54	4,800	-	68.660	268.72
55	400	-	Level	268.72
56	5,000	29.568	-	296.72

Table of Grades from Peoria to Bloomington—Continued.

No. of grades.	Length in feet.	Activity per mile, in feet and decimals.	Declivity per mile, in feet and decimals.	Height above base line, in feet and dec.
57	200	Level	Level	296.72
58	1,700	-	44.88	282.27
59	200	-	Level	282.27
60	1,800	21.120	-	289.47
61	300	Level	-	289.47
62	1,000	-	26.40	284.47
63	200	-	Level	284.47
64	1,800	15.84	-	289.87
65	200	Level	-	289.87
66	1,900	-	26.40	280.37
67	2,100	-	Level	280.37
68	1,600	-	10.56	277.17
69	800	-	Level	277.17
70	3,400	39.60	-	302.67
71	2,100	Level	-	302.67
72	1,900	26.40	-	312.17
73	6,500	Level	-	312.17
74	5,500	-	14.784	296.71
75	1,700	-	31.68	286.57
76	3,000	-	Level	286.57
77	4,300	60.192	-	335.59
78	1,000	Level	-	335.59
79	2,600	-	72.336	299.97
80	800	-	Level	299.97
81	3,700	61.192	-	342.13
82	3,000	47.520	-	369.13
83	1,900	Level	-	369.13
84	2,800	-	47.520	343.93
85	400	-	Level	343.93
86	2,800	47.520	-	369.13
87	200	Level	-	369.13
88	3,000	-	58.08	336.13
89	2,200	-	Level	336.13
90	2,400	-	47.520	314.53
91	1,100	-	Level	314.53
92	3,700	50.688	-	350.05
93	2,500	26.400	-	362.55
94	200	Level	-	362.55

The commencement of the road at Pekin is 35.50 feet above low water in the Illinois river.

CENTRAL RAILROAD.

Further instructions directed my attention to the examination and survey of a route for that portion of the Central railroad between Bloomington and the Sangamon river. In accordance therewith, on the 9th of August, a line was commenced at the former place, in Washington street, at the present ending of the location line between Bloomington and Pekin, and run in the direction of said street to a point near the southern boundaries of the town. From this point the true course to Decatur was determined, as near as practicable, with a view of running a straight line all the way to that place, as instructed by you. Accordingly, it was continued direct as far as the edge of the prairie south of Salt creek, except a slight variation for a short distance in passing the breaks of

the Kickapoo creek, between ten and eleven miles from the starting point. The whole distance thus run is 26.85 miles. The first three miles from Bloomington passes through a forest called Blooming grove: thence through a prairie for nearly five miles, and we reach Randolph's grove, which is about three miles across, and through which runs the Kickapoo creek: thence passing a prairie of nearly three miles and a half wide, the timber of Long Point creek is reached. It is near one mile and a half across. Thence intervenes a prairie of nearly six miles wide, and we reach the timber of Ten-mile and Salt creeks, the former a tributary of the latter. This timber is near five miles across, and extends to the edge of the prairie before alluded to. The prairies described present no difficulty to the construction of the road; but in the timber very serious obstacles exist, the ground being much broken by the passage of those streams. In Blooming grove the greatest difficulty is the high land which we find there. It is four hundred and sixty-five feet above the Illinois river at Pekin, and the highest land between that place and Decatur. It would require a cut a little over a mile in length and fifty feet in depth at its vertex, to bring the road to a grade of forty feet per mile. The passage of the Kickapoo would also be expensive on this line; but the most serious difficulty of all would be the valley of Salt creek. This route proving more unfavorable than was anticipated, and the crossing of Salt creek evidently less expensive farther east, it was deemed useless to extend the straight line any further. The remainder of the distance to Decatur being chiefly prairie, and no particular choice in the ground, it was considered the best economy to continue a line to Decatur that would correspond with the most favorable route across the valley of Salt creek. Accordingly an offset of half a mile was made to the east, to a point in a north and south section line which passes nearly through the centre of Decatur: thence following this line to that place, and through Water street, to station 2,317, near the southern boundary of the town; making the distance from the offset to this point, 17.05 miles, and the whole distance from Bloomington, exclusive of the offset, 43.88 miles. From this point a deflection was made to the west, and a direct line run to the bluff, on the south side of the Sangamon river, 1.09 miles further, reaching the river at a point where it approaches the nearest to Decatur. The direction of this line was unfavorable, and the very broken ground over which it passed, still more so. The abrupt ascent of the bluff on the south side was also an additional objection; consequently it was abandoned. The surface of the country between Decatur and the river is extremely broken and difficult.

In reconnoitering the country south of the river, the valley of Ward's branch, which lies in a favorable direction, presented itself as being the most feasible route for ascending from the valley of the Sangamon to the table land. The mouth of this valley is about one mile and a half above where the river was intersected by the first line. The line then through Water street was extended from station 2,317 in that direction, curving to the east and passing the intervening hills and valleys in the most favorable manner, crossing the river about two hundred and eighty yards below Allen's mill, and at the distance of 1.28 miles from Decatur: thence continuing obliquely across the valley and reaching the bluff at the distance of near three-fourths of a mile further, where it comes to a point at the junction of Ward's branch, and where a curve of eight hundred feet radius will have to be instituted for a short distance in order to effect an entrance into the valley of said branch. The whole distance from Bloomington to the mouth of Ward's branch is forty-six miles. The survey was not continued further. This branch is about five miles in length, and, from its appearance, would admit of moderate grades and curvatures, excepting the latter, at the mouth of the valley, already noticed.

Two other routes through the town of Decatur presented claims for examina-

tion—one west and the other east of the line through Water street; and in discharge of our duty with regard to them, two lines were run through the town parallel with the first, commencing eight hundred feet north of the town opposite station 2,290; the one being nine hundred feet west and the other seven hundred east of the first line. The former, at the southern boundary of the town, curves to the east and intersects the line twenty-eight hundred feet south of the town, and one mile and two hundred and twenty feet from the starting point. The other was continued direct to the first one, and intersects it still farther south.

A comparison of the expense of these routes result in favor of the eastern, and shows the route through Water street to be the most expensive. Although the name might indicate the contrary, Water street is the highest part of the town, and would require a cut of from ten to fifteen feet deep for nearly its whole length; which would render it inconvenient to transact business on the road at that place. That circumstance alone would be a sufficient reason for determining in favor of either of the other routes. The line north of the town can be adjusted to either without increasing the expense.

I expected to have been able to have extended this line north to Bloomington, commencing at the offset before mentioned, south of Salt creek, but my party chiefly all becoming sick, I was obliged to dismiss them, and the unhealthiness of the country at that time, and the prevalence of disease, was such that it was impossible to procure hands. I was therefore compelled to suspend further operations. Considerable inconvenience and delay were experienced in the course of the season, having been obliged on two occasions previous to dismiss the hands on account of inability from the same cause, and to employ, with one or two exceptions, entire new sets.

Further examinations will be necessary between Salt creek and Bloomington, before a route for the location of the road can be determined on. But I am of the opinion that the most favorable route between the offset, south of Salt creek and Randolph's grove, would coincide nearly, if not quite, with the same section of line that was traced between the offset and Decatur; thus making a straight line from the latter place of about 32.50 miles, and passing on the eastern boundary line of Clinton, a town situated about midway between Bloomington and Decatur. Before quitting the field we took occasion, although with much inconvenience for the want of hands, to run sections across the valley of Salt creek, Long Point, and the Kickapoo creeks upon this section line; and although still found expensive, the two first of these crossings bear a favorable comparison with those on the first line, but the crossing of the Kickapoo and its branches through Randolph's grove were found much more expensive. It is probable that the better route through this grove will be found somewhere between the two lines, which are a little more than a mile and a quarter apart. In Blooming grove the high land will be avoided in a great measure, and the advantage of a better route gained by keeping from half a mile to a mile east of the present line.

The line between Bloomington and the Sangamon river will be mostly straight, as has been shown, and no curves, it is believed, will be required under one thousand nine hundred and ten feet radii. The grades will probably reach forty feet per mile for about one-fifth of the distance. The groves through which this route passes will afford an abundance of excellent timber for the bridges and superstructure of the road; and having neglected it in its proper place, I will here remark that the branches between Bloomington and the Illinois river possess the same advantage, being convenient to timber.

The same kind of material that was recommended for bridge abutments and culverts on those branches, is also considered the most suitable for the same purpose on this road, there being no stone on the whole route except in the bluffs of the Sangamon river.

There, it is probable that an extensive quarry of lime stone might be opened within a mile and a half of the crossing of the river, and which would afford convenient materials for the construction of the bridge abutments at that place, and also the culverts in the vicinity. But it is thought that the superiority of stone over good brick would not justify the transportation of the former to a distance that would raise the price above that adopted for the latter, unless it be the foundations of heavy bridge abutments or coping.

Between Bloomington and the bluff south of the Sangamon river, the estimate of the probable cost of graduations on the present line is exhibited in the tables appended to this report.

From Bloomington to the prairie south of Salt creek, 27 miles, the cost would amount to 460,269 dollars, and makes the average cost per mile, 17,040 dollars. The remainder of the distance, by way of the eastern line through Decatur, (19 miles) will cost 75,421 dollars, and averages \$3,969 per mile. The first sixteen miles of this distance amounts to 31,040 dollars, and the last three miles to 44,381 dollars; the former averaging \$1,940 per mile, and the latter \$14,793.

The entire distance, (46 miles) amounts to 535,690 dollars, and averages 11,645 dollars per mile.

To adopt the line through Water street, in Decatur, would add 14,914 dollars to the total expense, and the line through the western part of the town, 7,394 dollars.

The valley of Salt creek is the greatest obstacle that is met with in the whole route. By crossing it and the valley of Long point on the section line before described, there would be a saving of 81,554 dollars, that is, admitting the other parts of the route to be equal. The three miles through Blooming-grove, on the present line, amount to 127,769 dollars; but it is confidently believed that, by running a line further east, and thus avoiding the deep cut, the expense per mile, on the three miles, will not exceed 12,000 dollars, and thereby reduce the cost 91,769 dollars. The expense on the section line through Randolph's grove was found to be more than on the line first run, by 26,140 dollars; but there is no doubt entertained that a route equally favorable as the first, if not more so, may be found without departing materially from the most favorable direction.

Now, counting the expense through Randolph's grove the same as on the first line, the expense of the entire route, according to the foregoing statements, would be reduced 173,323 dollars; making it 362,367 dollars, and averaging 7,877 dollars per mile.

I regret exceedingly that I have not sufficient data to enable me to approximate to the actual cost with more certainty. I feel confident, however, that it will not exceed the above estimate, and may be very considerably lessened.

At the request of the Commissioner, Mr. McConnel, I made an examination of the country immediately west of Decatur, with a view to ascertain the practicability of extending the Northern Cross railroad more directly to Decatur than by intersecting the line of the Central railroad four miles north of the town, as recommended by Mr. Frederick Hawn, the engineer who surveyed the route last season.

I found the country much broken for the distance of nearly four miles

west. The valley and breaks of Stephen's creek, and those of several of its tributaries, are embraced within that distance, the first of which presents the most formidable difficulty.

I assumed a point in Mr. Hawn's line near station 897, at the intersection of a range and section line, four miles, or at least four sections, west of Water street in Decatur. From this point an offset was made, north half a mile, which affords an opportunity of passing the broken ground immediately east to better advantage. From thence, the line was continued tolerably direct to Decatur, crossing Stephen's creek at a point where it approaches nearest to the town, and terminating at station 2,305 (a suitable point) in the line for the Central railroad through the eastern part of Decatur, making the distance 4.13 miles.

This line evidently passes near the most favorable ground that is presented within that distance, except a portion next the west end, which would be better adapted to the ground by starting from a point a fourth of a mile from Mr. Hawn's line, instead of half a mile. The expense of the line west of this offset would not be altered materially, either way, by adjusting it to any line that may be found the most suitable from thence to Decatur.

The extension of the line to Decatur, by this route, passes mostly through timbered land, some of which would be very suitable for the use of the road.

The following table exhibits the probable cost of graduation for the line above described.

No. of miles.	Excavation.			Embankment.			Masonry.			Grubbing and clearing.	Total cost of each mile.
	Amount of cubic yards.	Cost per yd.	Total cost.	Amount of cubic yards.	Cost per yd.	Total cost.	No. of perches.	Cost per perch.	Total cost.		
1	28,535	18	\$5,136 30	22,655	18	\$4,077 90	100	\$6	\$600	\$100	\$9,914 20
2	17,001	17	2,890 17	24,069	17	4,091 73	48	6	288	250	7,519 20
3	49,394	20	9,878 80	57,637	20	11,527 40	1,294	6	7,764	250	29,420 20
4	11,823	18	2,128 14	10,251	16	1,640 16	80	6	480	30	*720 00
feet 1657	1,017	13	132 21	2,740	15	411 00	14	6	84	-	4,278 30
	107,770		\$20,165 62	117,352		\$21,748 19	1,536		\$9,216	\$630	\$52,479 81

*Superstructure for bridge, 40 lineal feet, at \$18 per foot.

Total cost of graduation - - - - - \$52,479 81

Total cost of superstructure = \$5,495 x 4.13 miles = 22,694 35

75,174 16

Add ten per cent. for contingencies 7,517 41

82,691 57

Total cost per mile - - - - - \$20,922 17

Accompanying this report are the maps and profiles of the different routes.

In conclusion, I will remark that the gentlemen by whom I was assisted in the execution of these surveys, especially Mr. Charles Hardin, are entitled to much credit for the ability and fidelity which they have manifested in the discharge of the respective duties assigned them.

Respectfully submitted,

WM. POLLOCK,

Senior Assistant Engineer, Western District.

MONTHLY ESTIMATES

OF

THE NORTHERN CROSS RAILROAD.

GRAD

Date.	Names of contractors, and locality of work and materials furnished.	Excavation.		Embank
		Cubic yards.	Cost per y'd.	Cubic yards.
1837.			<i>cents</i>	
September	January, Dunlap & Co., 1st section, 1st division -	6,200	26½	14,466
October	Same do. do. -	7,450	20	8,349
November	Same do. do. -	3,600	20½	7,150
November	Same 2d section, 1st Mauvaisterre -	2,000	20	9,000
December	Same do. do. -	4,820	30	7,278
1838.				
January	Same 1st section, 1st division -	5,000	25	7,000
January	Same 2d section, 1st Mauvaisterre -	12,386	27	10,347
January	Calhoun, Early & Co., 3d division -	2,930	20	3,257
February	January, Dunlap & Co., 1st section, 1st division -	-	-	-
February	Calhoun, Early & Co., 3d division -	600	22	2,768
February	January, Dunlap & Co., 2d section, Mauvaisterre -	500	27	500
March	Same do. do. -	5,721	27	14,828
March	Same 2d section, 1st division -	2,880	30	5,000
March	Calhoun, Early & Co., 3d division -	662	24	435
April	January, Dunlap & Co., 2d section, 1st division -	22,260	30	20,000
April	Same 2d section, 1st Mauvaisterre -	11,521	27	11,849
April	Calhoun, Early & Co., 3d division -	901	-	9,901
May	January, Dunlap & Co., 1st section, 1st division -	15,000	33½	30,000
May	Same 2d section, 1st Mauvaisterre -	-	-	8,563
May	Calhoun, Early & Co., 3d division -	272	26	16,604
June	January, Dunlap & Co., 1st division -	10,170	30	5,000
June	Same 2d sec. 1st div. Mauvaisterre -	2,020	30	93
June	Same 2d division -	11,788	50	28,600
June	Same 2d div. Briar fork & South fork -	3,590	20	7,903
June	Calhoun, Early & Co., 3d division -	5,000	25	8,553
July	January, Dunlap & Co., 1st division -	-	-	-
July	Same 1st division, Mauvaisterre -	1,230	27	1,718
July	Same 2d division -	-	-	-
July	Same 2d div. South & Briar forks -	1,010	20	9,998
July	Calhoun, Early & Co., 3d division -	2,144	24	7,217
June, July	S. Grubb, 3d division, Sangamo viaduct -	-	-	-
August	January & Dunlap 1st division -	-	-	-
August	Same 1st division, Mauvaisterre -	9,489	30	7,593
August	Same 2d division -	-	-	-
August	Calhoun, Early & Co., 3d division -	9,285	24	-
August	S. Grubb, 3d division, Sangamo viaduct -	-	-	-
September	January, Dunlap & Co., 1st section, 1st division -	-	-	-
September	Same 2d sec. 1st div. Mauvaisterre -	6,095	30	5,500
September	Same 2d division -	-	-	-
September	Calhoun, Early & Co., 3d division -	6,388	22	4,381
September	S. Grubb, 3d division, Sangamo viaduct -	-	-	-
October	January, Dunlap & Co., 1st division -	-	-	-
October	Same 2d sec. 1st div. Mauvaisterre -	3,166	30	2,976
October	Same 2d division -	-	-	-
October	Same 2d division -	6,666	30	-
October	Calhoun, Early & Co., 3d division -	2,150	24	6,416
October	S. Grubb, 3d division, Sangamo viaduct -	-	-	-
Aug. Sept. and Oct.	Leslie & Collins, Naples branch Northern C. R.	2,400	17	12,378

the Northern Cross Railroad.

ING.

ment.	Rock excavation.		Hard-pan excavation.		Masonry culverts.		Foundation of culverts and stone delivered.	Masonry viaducts.	Foundations of viaducts.	Superstructure of viaducts.	Grubbing.	Extra grading and ditching.	Number of miles graded.
	Cost per y'd.	Cubic yards.	Cost per y'd.	Cubic yards.	Perches of 25 cubic feet.	Cost per y'd.							
cents.													
28	-	-	-	-	62	\$6	-	-	-	-	-	-	2
40	-	-	-	-	91½	10	-	-	-	-	-	45	3.06
24½	-	-	-	-	-	-	-	-	-	-	\$200	-	1.95
30	-	-	1,000	40	-	-	-	-	-	-	-	-	-
30	-	-	500	40	-	-	-	-	-	\$500	-	-	-
25	-	-	-	-	56	12	-	-	-	-	-	-	1.00
30	-	-	-	-	66.4	10	-	-	-	300	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	\$300 00	-	400	-	-	-
30	-	-	-	-	-	-	-	600 00	-	-	-	-	.85
30	-	-	-	-	940	-	-	-	-	-	-	-	-
35	-	\$2	-	-	110	9½	\$234	-	-	-	-	-	-
35	500	-	-	-	-	-	393	-	-	-	-	-	5.62
45	-	-	-	-	388	10	-	-	-	-	-	-	-
30	-	-	-	-	840	-	-	-	-	-	-	580	4.50
35	652	2	-	-	840	-	-	-	-	-	-	-	-
40	-	-	8,884	50	1,310	10	1,980	3,096 00	-	-	-	-	-
30	-	-	-	-	250	7	-	-	-	-	-	-	-
35	-	-	-	-	500	-	1,470	-	-	-	-	-	5.00
40	116	1	-	-	-	-	-	-	-	-	-	1,659.6	-
40	-	-	-	-	-	-	-	-	-	-	800	-	-
40	-	-	-	-	-	-	-	-	-	-	-	-	-
35	333	2	-	-	-	-	-	423 00	-	-	-	-	-
30	-	-	1,718	50	780	-	-	-	\$1,500	980	-	-	*2.72
40	-	-	-	-	-	-	1,400	2,700 00	-	-	-	-	6.00
21, 35	-	-	-	-	-	-	-	427 50	-	-	-	-	-
-	-	-	-	-	-	-	-	836 00	-	-	-	-	-
30	-	-	-	-	-	-	1,400	3,450 00	-	1,500	-	-	-
-	-	-	-	-	810	-	-	-	-	-	-	-	4.00
-	-	-	-	-	-	-	-	711 00	-	-	-	-	-
-	-	-	-	-	-	-	-	3,840 00	-	-	-	-	-
30	782	2	-	-	-	-	1,817	3,612 00	-	500	-	-	4.75
-	-	-	-	-	655	-	-	186 00	-	-	-	-	-
22	-	-	-	-	50	9½	-	428 00	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	2,000	5,746 00	-	1,000	-	-	7.00
-	-	-	-	-	940	-	4,000	1,800 00	2,000	-	-	-	-
30	-	-	-	-	38.81	8¾	-	272 00	-	-	-	-	-
-	-	-	-	-	-	-	-	3,040 00	-	-	-	-	-
17, 43	-	-	-	-	72	8	-	-	-	-	-	-	-

*Balance due on grading per mile work.

SUPER

Date.	Names of contractors, and locality of work and materials furnished.	Mud sills, lineal feet.	Number of cross-ties.	Longitudinal sills per lineal foot.
1837.				
September	January, Dunlap & Co., 1st section, 1st division -			
October	Same do. do. -			
November	Same do. do. -			
November	Same 2d section, 1st Mauvaisterre -			
December	Same do. do. -			
1838.				
January	Same 1st section, 1st division -	12,000	1,000	
January	Same 2d section, 1st Mauvaisterre -			
January	Calhoun, Early & Co., 3d division - - -		395	5,948
February	January, Dunlap & Co., 1st section, 1st division -	2,000		14,000
February	Calhoun, Early & Co., 3d division - - -	578		7,140
February	January, Dunlap & Co., 2d section, Mauvaisterre -			
March	Same do. do. -			
March	Same 2d section, 1st division -			9,200
March	Calhoun, Early & Co., 3d division - - -			
April	January, Dunlap & Co., 2d section, 1st division -	6,068	3,135	12,117
April	Same 2d section, 1st Mauvaisterre -			
April	Calhoun, Early & Co., 3d division - - -			
May	January, Dunlap & Co., 1st section, 1st division -	28,900		
May	Same 2d section, 1st Mauvaisterre -			
May	Calhoun, Early & Co., 3d division - - -			6,723
June	January, Dunlap & Co., 1st division - - -	20,000	15,000	20,000
June	Same 2d sec. 1st div. Mauvaisterre -			
June	Same 2d division - - -			6,632
June	Same 2d div. Briar fork & South fork -			
June	Calhoun, Early & Co., 3d division - - -		1,100	7,666
July	January, Dunlap & Co., 1st division - - -	35,000	13,000	30,000
July	Same 1st division, Mauvaisterre -			
July	Same 2d division - - -	26,475		25,752
July	Same 2d div. South & Briar forks -			
July	Calhoun, Early & Co., 3d division - - -		186	2,296
June, July	S. Grubb, 3d division, Sangamo viaduct -			
August	January & Dunlap 1st division - - -	18,000		17,060
August	Same 1st division, Mauvaisterre -			
August	Same 2d division - - -			
August	Calhoun, Early & Co., 3d division - - -		1,367	
August	S. Grubb, 3d division, Sangamo viaduct -			
September	January, Dunlap & Co., 1st section, 1st division -	5,000	6,200	
September	Same 2d sec. 1st div. Mauvaisterre -			
September	Same 2d division - - -			
September	Calhoun, Early & Co., 3d division - - -			
September	S. Grubb, 3d division, Sangamo viaduct -			
October	January, Dunlap & Co., 1st division - - -	22,500		28,300
October	Same 2d sec. 1st div. Mauvaisterre -			
October	Same 2d division - - -			
October	Same 2d division - - -			
October	Calhoun, Early & Co., 3d division - - -			
October	S. Grubb, 3d division, Sangamo viaduct -			
Aug. Sept. and Oct.	Leslie & Collins, Naples branch Northern C. R.	16,195	6,124	23,295

Cross Railroad—Continued.

STRUCTURE.

Number of wedges.	Spikes for cross-ties.	Altering railroad spikes and splicing plates.	Laying superstructure.	Additional tracks.	Number of miles laid.	Depots.	Engine House.
-	-	-	\$3,205	\$570 34	2		
50,000	-	-	3,000	300 00	2		
-	\$600	-	2,250	-	1.50		
-	-	-	2,000	-	1.33		\$971
-	3,312	450	-	-	2.25	\$3,050 00	
-	-	-	-	-	-	4,787 78	

FIRST DIVI

Date.	Names of contractors, and locality of work and materials furnished.	Gross amount of estimate,	Discount.
1837.			<i>per c't.</i>
September	January, Dunlap & Co., 1st section, 1st division -	\$5,996 90	15
October	Same do. do. -	6,585 70	15
November	Same do. do. -	2,500 00	15
November	Same 2d section, 1st Mauvaisterre -	3,700 00	15
December	Same do. do. -	4,331 40	15
1838.			
January	Same 1st section, 1st division -	4,450 00	15
January	Same 2d section, 1st Mauvaisterre -	7,712 32	15
January	Calhoun, Early & Co., 3d division -	-	-
February	January, Dunlap & Co., 1st section, 1st division -	1,340 00	33
February	Calhoun, Early & Co., 3d division -	-	-
February	January, Dunlap & Co., 2d section, Mauvaisterre -	980 00	15
March	Same do. do. -	5,999 07	15
March	Same 2d section, 1st division -	3,166 00	15
March	Calhoun, Early & Co., 3d division -	-	-
April	January, Dunlap & Co., 2d section, 1st division -	18,869 11	15
April	Same 2d section, 1st Mauvaisterre -	7,446 57	15
April	Calhoun, Early & Co., 3d division -	-	-
May	January, Dunlap & Co., 1st section, 1st division -	35,899 40	15
May	Same 2d section, 1st Mauvaisterre -	14,874 10	15
May	Calhoun, Early & Co., 3d division -	-	-
June	January, Dunlap & Co., 1st division -	19,731 00	15
June	Same 2d sec. 1st div. Mauvaisterre -	2,219 90	15
June	Same 2d division -	-	-
June	Same 2d div. Briar fork & South fork -	-	-
June	Calhoun, Early & Co., 3d division -	-	-
July	January, Dunlap & Co., 1st division -	28,639 40	15
July	Same 1st division Mauvaisterre -	4,161 90	15
July	Same 2d division -	-	-
July	Same 2d div. South & Briar forks -	-	-
July	Calhoun, Early & Co., 3d division -	-	-
June, July	S. Grubb, 3d division, Sangamo viaduct -	-	-
August	January & Dunlap, 1st division -	6,335 00	15
August	Same 1st division, Mauvaisterre -	11,474 60	15
August	Same 2d division -	-	-
August	Calhoun, Early & Co., 3d division -	-	-
August	S. Grubb, 3d division, Sangamo viaduct -	-	-
September	January, Dunlap & Co., 1st section, 1st division -	3,843 00	15
September	Same 2d sec. 1st div. Mauvaisterre -	11,689 50	15
September	Same 2d division -	-	-
September	Calhoun, Early & Co., 3d division -	-	-
September	S. Grubb, 3d division, Sangamo viaduct -	-	-
October	January, Dunlap & Co., 1st division -	10,510 00	15
October	Same 2d sec. 1st div. Mauvaisterre -	10,588 60	15
October	Same 2d division -	-	-
October	Same 2d division -	-	-
October	Calhoun, Early & Co., 3d division -	-	-
October	S. Grubb, 3d division, Sangamo viaduct -	-	-
Aug. Sept. and Oct.	Leslie & Collins, Naples branch Northern C. R.	15,340 84	-
		\$248,384 31	-

Cross Railroad—Continued.

SION.	SECOND DIVISION.			THIRD DIVISION.		
	Gross amount of estimate.	Discount.	Nett amount of estimate.	Gross amount of estimate.	Discount.	Nett amount of estimate.
		<i>per cent.</i>			<i>per cent.</i>	
\$5,097 37						
5,597 84						
2,125 00						
3,145 00						
3,681 69						
3,782 50						
6,555 47						
-	-	-	-	\$3,516 88	15—33	\$2,869 38
897 80	-	-	-	1,621 20	15—33	1,256 83
839 80	-	-	-			
5,609 20	-	-	-	4,770 71	15—30	3,765 52
2,691 10	-	-	-			
16,038 74	-	-	-	4,989 37	15	4,240 96½
6,329 41	-	-	-			
30,514 49	-	-	-	6,016 75	-	5,113 73
12,642 98	-	-	-			
16,771 35	-	-	-			
1,886 91						
-	\$18,246 34	15	\$15,509 39			
-	4,679 56	15	3,977 62			
24,353 49	-	-	-	5,831 75	15	4,956 98
3,537 61						
-	23,392 62	15	19,883 73			
-	9,110 00	15	7,743 50			
-	-	-	-	3,156 57	15	2,683 08
-	-	-	-	836 00	15	710 00
5,384 75						
9,753 41	14,000 00	15	11,900 00			
-	-	-	-	2,868 13	15	2,437 91
-	-	-	-	3,840 00	15	3,264 00
3,266 55						
9,936 07	14,000 00	15	11,900 00			
-	-	-	-	3,136 37	15	2,665 91
-	-	-	-	428 00	15	363 80
8,933 50						
9,000 31	26,949 80	15	22,907 33			
-	7,800 00	15	6,630 00			
-	-	-	-	2,590 30	15	2,201 75
-	-	-	-	3,040 00	15	2,584 00
13,039 82						
\$211,402 16	\$118,178 32	-	\$100,451 57	\$46,642 03	-	\$39,113 07

Monthly estimates of Pekin and Bloomington Branch Railroad.

Dates.	Numbers of sections.	Names of Contractors.	Excavation—cubic yards.	Cost per yard.	Embankment—cubic yards.	Cost per yard.	Masonry No. of perches.	Cost.	Grubbing and clearing.	Gross amount of estimate.	Per cent. discount.	Net am't of estimate.
1838.				<i>Cents.</i>		<i>Cents.</i>						
May	6	Wm. S. Maus	1,174	19	939	23	20	\$4 00	\$250	\$759 00	15	\$645 15
	5, 7, 8, & 9,	Horton Twitchel	5,828	16—20	6,309	20—28	8	6 00	463	3,230 00	15	2,746 23
	1, 2, 4, & 6,	Wm. S. Maus	6,746	18—27	11,149	16—23	70	4 00	40	4,844 00	15	4,117 40
June	5, 7, 8, 9, & 10,	Horton Twitchel	3,712	14—20	2,349	20—28	38	4 12	5	1,532 00	15	1,302 20
	1, 2, 4, & 6,	Wm. S. Maus	2,283	18—27	3,421	16—23	55	4 06	—	1,676 00	15	1,424 60
July	5, 7, 8, 9, & 10,	Horton Twitchel	3,951	14—20	3,416	20—28	78	4 12	—	2,111 00	15	1,794 35
	1, 2, 4, & 6,	Wm. S. Maus	1,938	18—27	5,331	16—23	75	3 06½	—	2,325 00	15	1,755 25
August	5, 7, 8, 9, & 10,	Horton Twitchel	3,725	14—20	4,770	20—28	100	4 12	50	3,297 00	15	2,802 45
Sept. &	1, 2, 4, & 6,	Wm. S. Maus	7,725	18—27	4,011	16—23	216	3 06½	—	3,258 00	15	2,769 30
October	5, 7, 8, 9, & 10,	Horton Twitchel	5,396	14—20	7,967	20—28	439	4 12	—	5,020 00	15	4,367 00
			42,928	—	19,662	—	1,099	—	—	28,052 00	—	23,623 93
July.		Paid Charles G. Scott & Co., contractors, on account of timber for superstructure								500 00	15	335 00
October.		Paid Charles G. Scott & Co., contractors, on account of timber for superstructure								1,000 00	15	850 00
										29,552 00	15	24,808 93

SUMMARY.

	Grading.	Superstructure.
	Amount of work done, and cost.	Total cost of superstructure, exclusive of iron, including 3,400 feet of double track, at \$3,700 per mile.
	Amount of work remaining to be done, and cost.	Amount paid on work done.
	Original amount of work, and cost.	Amount remaining to be paid.
Cubic yards excavation	62,604	
Cubic yards embankment	87,403	
Perches of masonry	1,520	
No. of lineal feet supt. for bridges	100	
Total cost	\$40,297	\$1,500
	\$28,052	\$37,740
	\$28,052	\$36,240

EXHIBIT No. II.

REPORT OF WILLIAM KINNEY,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, December 20, 1838.

To the Board of Commissioners of Public Works of the State of Illinois.

The undersigned, acting Commissioner on the public works for the second judicial circuit, and on so much of the great western mail route as is situated in the third judicial circuit, respectfully reports the progress of his operations for the last six months on the several works assigned to his charge as acting commissioner thereon, as follows, that is to say:

ALTON, HILLSBORO, AND SHELBYVILLE RAILROAD.

At the last meeting of the Board, the above work was transferred from the western to the southern engineering district, and the surveys and examinations of the line were then in progress under the special charge of Mr. F. Hawn, assistant engineer. Mr. Hawn was forthwith requested to report himself to the principal engineer of the southern district.

He was immediately instructed to confine his examinations and surveys to that portion of the line between Alton and Hillsboro, in order that the portion of the work ordered by the Board to be put under contract might be let without delay. The character of the country and variety of routes proposed, made it necessary to establish the most elaborate examinations to arrive at correct conclusions in regard to the most judicious route for the road; and consequently much time was necessarily consumed in the surveys preparatory to the letting. The report and estimates of the assistant engineer are herewith submitted.

The letting of the grading and superstructure of the railway on the first thirteen miles from the city of Alton took place at the Internal Improvement office, in Belleville, on the 22d day of October last; and contracts have been entered into for the execution of the work, to be commenced within forty days, and to be completed within eighteen months from the day of letting.

The estimates of the portion of the line put under contract were as follows, viz:

For grading	-	-	-	-	\$50,420 27
Superstructure complete	-	-	-	-	45, 70 00
					<hr/>
Total	-	-	-	-	\$95,890 27

Making an average cost per mile, exclusive of iron, \$7,360 80, or about 9,000 dollars per mile, including that article.

The aggregate contract price of the work exceeded the above estimated cost about 2½ per cent., which would make the total cost \$97,287 47 or 7,484 dollars per mile, exclusive of iron for the track.

Since the lettings of the western division of the work, Mr. Hawn has extended his preliminary survey to Shelbyville, and has now disbanded his party. Sufficient time has not elapsed since the completion of the field work for him to make his report in detail; but he is now actively engaged, with a draftsman as assistant, in preparing his report, drawings, and estimates, which, when finished, will be laid before the Board.

I have, however, received from him a general report, in which he informs me that there are no serious obstacles to the economical construction of a useful railroad on the route; and that the cost of construction will be less per mile than that of the western division now under contract. The total length of the line, by the experimental survey from Alton to Shelbyville, is nearly one hundred miles.

There have not been any payments yet made on account of construction on this line of the work.

The disbursements for engineering, obtaining right of way, and other contingencies, up to this time, amount to \$596 87, and is chargeable to this work.

I have received propositions from the corporation of Upper Alton for the voluntary grant of lands for a depot in that town; and also from Robert Smith, Esq. for a like grant of land for a general depot for the above and the Southern Cross railroad, at the junction of the two lines, near Shields' branch, in the city of Alton. These several propositions have been submitted to your Board, and an order granted thereon.

SOUTHERN CROSS RAILROAD.

As stated in my last report, the western division of this road between the city of Alton and Edwardsville, making about fourteen and one-third miles, was placed under contract on the 15th day of February last. The grading of the several sections has progressed with an efficiency that gives a reasonable assurance of their completion within the time limited in the contracts. The hope I expressed in my last report, that the contractors for the superstructure would efficiently prosecute the work, has been disappointed, and I have been reluctantly compelled to declare their contract abandoned, and to re-let the work.

I accordingly advertised this part of the work, and re-let the same at the Internal Improvement office, in Belleville, on the 23d day of October last. This part of the work is now let to an efficient and experienced contractor, and at an advance of about one hundred and fifty dollars per mile over the price of the first contract.

The engineer's attested estimate for this work, including the cost of half a mile of double track and turn-outs, is as follows, viz.

For grading and bridging	-	-	-	-	\$50,586 99
Superstructure, exclusive of iron	-	-	-	-	45,274 35
Total, exclusive of iron	-	-	-	-	95,861 34
Iron and fixtures	-	-	-	-	33,970 00

\$129,831 34

Making an average cost, including one-half mile of double track and turn-outs, of \$9,058 21 per mile.

The contract price for the graduation and superstructure is about six per cent. above the estimate of the engineer; but from the purchases which have been made of railroad iron, it is ascertained that the estimate for that item was too liberal, and which, together with some reduction of cost by a subsequent change of grade on some of the heavy sections, will perhaps compensate for the difference between the contract and estimated prices of the whole work.

The total amount of work done on the contracts for grading and bridging, up to the 10th instant, as exhibited by the engineer's estimate thereof, on file, is \$30,053 15.

The whole amount disbursed for construction, after retaining 25 per cent. on amount of estimates, which have been paid up to November 30th, is \$21,458 91, leaving a balance necessary to complete the contracts for grading and bridging, according to the estimated price, and to pay over the retained per centage, of \$29,128 08.

The total amount paid by me for the out-fit of engineering parties, and expenses of the original survey and examination of the whole line, from the Wabash to the Mississippi river, and for the expenses of all subsequent engineering and contingent accounts, are as follows, viz:

For out-fit of engineering parties	-	-	-	-	\$ 427 73
Engineers and supplies	-	-	-	-	4,160 51
Contingent and office accounts	-	-	-	-	298 32
Lands entered	-	-	-	-	1,116 08
Proportionate share of general expenditure	-	-	-	-	3,467 31

\$9,469 95

At the last meeting of the Board, two miles of this line of work, including the crossing of the Kaskaskia river at the town of Carlyle, and the bridge over that river to accommodate both the railroad and the great western mail route, was ordered to be placed under contract. This work was surveyed by Mr. Terrell, assistant engineer, under the instructions of the principal engineer of this district, whose report and estimates are herewith submitted. The work was let at the Internal Improvement office in Belleville, on the 23d day of October last, and contracts closed therefor.

The crossing of the valley and river of the Kaskaskia is one of the greatest obstacles to be overcome on the whole route of this road between the Wabash and Mississippi, and necessarily embraces heavy and expensive work.

It is worthy of remark, however, that the two miles, and the crossing now let, embrace all the expensive work within many miles on each side of the river, and that the grading of the road can be continued in both directions with small comparative cost.

The estimated cost of the double-track bridge, and two miles of grading, is \$34,226 48; the contract price for the same work is \$33,132 18.

There has not been any payment for construction on this part of the work; and the expenses of the party engaged in its definite location have been paid by the Commissioner of the fourth judicial circuit, and charged to the work by him.

I have stated, under the head of another work, that I had received a proposition for the voluntary grant of lands for a depot, at the junction of this road and the Alton and Shelbyville railroad, in the city of Alton. As the proposition has met the views of the Board, I shall suggest the necessity of an order for the erection of a depot and machine shop at the above sites offered to the State.

The total ascertained length of the Southern Cross railroad, from the bank of the Wabash river, in Mount Carmel, to the bank of the Mississippi river, in the city of Alton, by the route of the experimental survey, the whole of which was surveyed under my direction, is 153 miles. The original survey, however, for a considerable portion of the line, was made in reference to a grade not exceeding 30 feet to the mile, and the residue of it to a grade within 40 feet. This necessarily increased the curvatures and length of the line, and added greatly to the labor and time necessary to make the survey. By adopting an increase of grade at some few points, the distance will be reduced; and, it is estimated by the engineer, will be brought within 147 miles. This change will also very materially reduce the first cost of the work without prejudicing the general utility of the road.

BELLEVILLE AND LEBANON BRANCH OF THE SOUTHERN CROSS RAILROAD.

This line of work has been surveyed, and several routes or points of connection with the main line examined. The result of the survey exhibits the practicability of a cheap construction of this important branch of our system of public works, and there exists no doubt of the extension of the road from Belleville to the city of St. Louis by the company now incorporated to construct it, as seven miles thereof, from the Mississippi river, are already constructed and in operation. I therefore submit to the Board, whether the claims of the citizens immediately interested in this road should be deferred any longer; and suggest the propriety of commencing the work at the next lettings which may be ordered.

The total length of this branch road, from Belleville to the intersection of the Southern Cross railroad, at or near Highland, in Madison county, is twenty-three and a half miles.

GREAT WESTERN MAIL ROUTE.

In the months of August and October last, I let all the jobs of work on so much of this road as lies in my district, which had not previously been contracted for.

All the contracts have been prosecuted with efficiency, except two of the largest on the American Bottom, which were let in October, 1837. After granting every indulgence to the contractors consistent with my duty, in order to enable them still to complete their contracts, and save to themselves the retained per centage on the work done by them, their inability to complete the work in any reasonable time became manifest, and I accordingly declared their contracts abandoned in the month of October last. As the work was left in an unfinished state, and the public interest imperatively demanded that this part of the road should be placed and kept in a condition to be travelled during the winter, I employed superintendents and laborers, and am now prosecuting the work with them.

The engineer's estimate of the work proposed to be executed on the American Bottom division, was \$28,734 68; and the contracts were taken at about the estimates of the engineers, (say 29,000 dollars.)

The disbursements on this division of the work have been as follows, viz: For construction, \$11,268 10, leaving a balance of the special appropriation for this part of the work, of \$18,731 90.

The engineer's estimate of the probable cost of the work proposed to be executed on the whole western division, extending from the American Bottom to the eastern line of Marion county, a distance of ninety miles, amounts to \$86,896 not including Albright and Rodger's estimate.

In order that the disbursements of the general appropriation for this work might be fairly apportioned over the whole line, from the Wabash to the Mississippi, agreeably to law, the contracts are let, specific as to price, but conditional as to amount and description of work to be executed by contractors, reserving the right to the Commissioners to designate, from time to time, what specific portions and items of work on the respective contracts shall be first commenced and completed—with the understanding, however, that the bridging and most difficult portions of the road shall be first executed. So that, although the account of all the work embraced in the contracts, if fully completed, might overrun the appropriation; yet the reservations in the contracts will enable the Commissioners to keep the disbursements within those limits.

The total amount of disbursements on this line of work, exclusive of the American Bottom, are as follows, viz:

For construction, engineering, superintendence, and contingencies	\$57,021 10
Proportionate share of general expenditure account	6,521 74
	\$63,542 84

In the above amount for outfit, engineering, and contingencies, is embraced the cost of the original survey and location of the whole line of road from St. Louis to Vincennes, made by Mr. Gilpin, the assistant engineer, under my directions.

A tabular statement marked A, accompanying this report, exhibits more fully, and in detail, the number, extent and present condition of the several contracts or jobs on this work, with the names of the contractors on each, respectively; to which statement I respectfully refer the Board for further information.

The total ascertained length of this road is 152 miles, 14 miles of which are west of Belleville, and 138 east of that point.

CENTRAL RAILROAD.

The portion of the Kaskaskia division, embracing the crossing of that river near Vandalia, which the Board ordered under contract at their last semi-annual meeting, was let at Vandalia on the 13th day of August last.

The engineer's estimate for this work, including the cost of masonry for the bridge over the river, was \$44,660 03.

The amount of the contract price for the same work amounts to \$42,778 19.

The disbursements made by me on account of this work are, for construction, \$461 67

Experimental lines for this work have been run throughout my circuit, and the result of them, I presume, will be found in the report of the Commissioners of the third and fourth circuits, under whose immediate direction the surveys were conducted.

ALTON AND SHAWNEETOWN RAILROAD.

The preliminary examinations and surveys of this road, which were in progress at the date of the last meeting of the Board, under the charge of Mr. Lathrop, assistant engineer on the work, have been completed. The report of the assistant engineer, accompanied by the drawings and estimates of the Silver creek sections of work, which were ordered under contract by the Board at their June meeting, is all that has been received by me in relation to that survey. The report on the other portion of the line, I am informed, has been delayed by sickness, and other causes beyond the control of the engineer.

The grading of the Silver creek sections of the work, including a distance of a fraction over three miles, and embracing the crossing of the creek, was offered for contract, and let at the Internal Improvement office in Belleville, on the 23d day of October last. The contracts were let under the condition that the line should undergo a revision, which the principal engineer then thought to be necessary, and which there was not time to effect before the day of letting. This revision has subsequently been made, and the contractors have efficiently commenced their respective jobs.

The revised estimates amount to \$14,620 47, and the contract price will not materially vary from that amount. The cost of the original survey of this work has been paid by the Commissioner of the third judicial circuit, and by him charged to this work. The expenses of the subsequent revision of the line at Silver creek comprise all the disbursements yet made by me; and this having been done by the engineer.

engaged on the Southern Cross railroad and Western mail route, and the amount being comparatively trifling, it has been charged to other accounts, and no account has yet been opened by me against this work.

KASKASKIA RIVER IMPROVEMENT.

As stated in my last report to the Board, the examination and survey of the obstructions to the navigation of this river were commenced about that date, and were conducted under the immediate directions of Col. Wm. C. Greenup, engineer on the work. The report, drawings, and estimates of the engineer have been filed in the office of the Board of Public Works, and exhibit, in detail, the nature and extent of the several obstructions, and the plans proposed for their removal.

The survey and examinations developed the fact that the work, necessary and practicable to be executed, would not admit of such definite specifications and description as to enable contractors to bid understandingly for it, or the Commissioner to prosecute it by contract. I therefore determined to lose no time in waiting for the action of the Board, but proceeded to prosecute the work by superintendents and laborers employed and paid by me as acting Commissioner.

The report of Col. Greenup, the superintending engineer on the work, dated the 3d instant, and herewith submitted, explains in detail the operations on the river up to that date.

The total disbursements made on account of this work, up to the 28th ultimo, were as follows, viz.

Amount of disbursements charged to work	- -	\$1,846 30½
Proportionate share of general expenditure	- -	211 17

2,574, 47½

The requisition of the Fund Commissioners to divide among the several works the expenditures heretofore made and charged to the general fund account, has been complied with by me with as much accuracy as the nature of the case will admit of. I still entertain the opinion, however, that a general fund account is contemplated by the internal improvement law. There are a variety of expenditures—as the entry of lands, the purchase of teams, camp equipage, and surveying instruments, the compensation of the secretary of the Board, and numerous others authorized by law—and yet not properly chargeable to any particular work or appropriation. If there are any doubts on this subject, it is well that they should be agitated at the present time, when the whole matter can be set at rest by legislative enactment.

After this general division of the general fund account amongst the several works under my charge, the total amount expended by me and charged to them, respectively, to Nov. 30, inclusive, is as follows, viz:

On the Great Western Mail route	- - - -	\$63,512 84
On the Southern Cross Railroad	- - - -	30,953 76½
On the Belleville and Lebanon Branch Railroad	- - - -	371 48
On the Alton and Shelbyville Railroad	- - - -	665 07
On the Central Railroad	- - - -	9,644 25
On the Kaskaskia river Improvement	- - - -	2,057 47½

Total amount expended - - - - - \$105,235 25

The report of the principal engineer of the southern engineering district, together with the reports of the assistant engineers in my circuit, therein referred to, is herewith submitted.

GENERAL REMARKS.

My situation as President of the Board has, no doubt, tended to increase my correspondence beyond that of the other Commissioners; and it has added much to the office labor and attention in my circuit. This correspondence has been carefully preserved, and, for the most part, put on record for the use of the Board and their successors.

From my long residence and the opportunities I have had of observation, and particularly in the southern section of the State, it might be presumed, and I indeed thought myself, that I was long since fully aware of the advantages of the country. I must, however, confess that the journeys I have taken in attending the meetings of the Board and the various lettings of contracts, in which I have travelled not less than two thousand miles since I entered on the duties of my office, have developed facts, and presented aspects of the country of which I had not been previously aware; and which have more fully demonstrated to my mind the great importance of our system of internal improvements. In the nature of things, I cannot expect to see, in my life-time, the full development of these advantages, and to enjoy them. But, believing conscientiously that the future prosperity and happiness of the people will be greatly promoted by carrying out the system to its full and entire completion, I am bound to advocate it to the extent of my abilities. So far from its being too large and extended, I believe that it might be enlarged with great propriety and decided advantage to the general welfare of the whole State, if suitable appropriations were made, in addition to those already granted by the Legislature, not only to improve the navigation of our rivers, but, in connection with the same, to drain the ponds and lakes; which can be accomplished with an inconsiderable expense, in comparison to the general utility, health, and pecuniary prosperity of the whole State.

In the low grounds, in many cases, five hundred or a thousand acres of land can be drained and reclaimed with less than a hundred dollars expense; and the draining of the Great American Bottom itself, it is believed, would increase the value of the soil therein at least five millions of dollars; all of which can be effected with an expense not exceeding two hundred thousand dollars; and as an evidence of the improvement of health, it is an incontrovertible fact that the town of Kaskaskia, which is situated on the bank of Kaskaskia river, between that river and the Mississippi, and near the junction of the former, has always been and is one of the most healthy towns in the State; the obvious reason of which is, that lakes and ponds do not exist below the point of the bluff between the two rivers, so that when each or either are high and overflow their banks, they again recede to their original channels without remaining to form lakes or ponds, which has been the great cause of such deleterious effects as are so seriously felt in other portions of the American Bottom.

Our system, it is true, is large and spacious, but not more so than the beauty, the fertility and peculiar situation of our State demand. The facility with which settlement and farms can be made, and the certain and abundant reward which awaits the toil of the agriculturist, is inducing, and has caused an unprecedented amount of this valuable description of emigration to every portion of the State.

The southern section of the State, which has heretofore been measurably overlooked or underrated, is now, in common with the more favored north, attracting the notice of the enterprising settler.

To conquer the forests of Kentucky and Ohio, or the older States, and prepare the face of the country for profitable cultivation, has cost, in time and labor, more capital in each than would complete many such systems of internal improvements as ours; whereas, in Illinois, the land is found cleared to our hands—the farmer has but to plough, to plant, and to gather.

The roads themselves, from this peculiar character in the face of the country, can be constructed with great ease and rapidity. By commencing the improvements at the rivers where lumber is abundant, and running them into the interior, the materials for the railways, as well as for fencing and building, are transported into the very heart of the great prairies, with less cost than they can be carted a few miles with an ordinary team. The settler can carry his house with him, and put up a shelter for his family, with the same ease that a surveyor would pitch his tent, and his posts and plank would follow him to fence his field before oxen could prepare the ground for his crop. His articles of consumption would come in the same convenient channel, and whatever surplus his industry and the fertility of his soil would produce, would find a ready market at his own door.

I am persuaded this is no fancied picture; for already are the prairies rapidly being entered by intelligent farmers in anticipation of these obvious results. Moreover, the country along the lines of these improvements will enjoy all the advantages of the best navigable streams in the State, without any of their deleterious effects, which are always apprehended, and but too often felt, by the inhabitants along their borders.

The great Central railroad through the centre of the State will, under the present system, be intersected with numerous cross roads, connecting with the rivers on our borders and the work in progress, or in contemplation, in Indiana, and will afford the facility of throwing into the southern market the surplus products of the State, at a time when the Ohio and Upper Mississippi, and their numerous tributaries, are locked up with ice, or impeded with shoals, and thereby enable the farmer to command the best possible price for his produce. The articles of consumption can likewise be distributed to every portion of the State, with certainty and economy, and at all seasons of the year, without any interruption, and thereby prevent those fluctuations in price, caused by the inequality of demand and supply, which are so prejudicial both to the dealer and consumer. Were this system now in operation, the present deficiency in the supply of the indispensable article of salt, so seriously felt in many portions of the State, and which has been caused by the interruption of the navigation during the last season, could not have happened.

The increase in price which the citizens of this State will pay the present year, for this article alone, will exceed, in all probability, double the taxes of the State, to say nothing of other articles of indispensable necessity, which, from the same causes, have been greatly enhanced in price.

These general advantages, which would result from the completion of the system and its gradual increase as the means of the State would warrant, are not all the advantages I anticipate from it. I believe that, in point of revenue, it will disappoint its most sanguine friends. If the amount of travel and transportation which now passes between Louisville and St. Louis, or Chicago and the several points on the Mississippi, be taken as a basis of calculation, no reflecting man can doubt that the work must yield a handsome revenue to the State. Residing on the great western mail route, I have had an opportunity of observing the amount of travel during the last season of low water in the Ohio, between Louisville and St. Louis. The line of mail stages on this route, during the whole period of this continued drought, carried passengers, which averaged, at the ordinary fare, (as I have understood,) fifteen hundred dollars per week, or at the rate of about \$75,000 a year. And during the same period, every means of travel, by private conveyances, which could be obtained in Louisville, seemed likewise to be put in requisition. During this period, an intelligent gentleman of Missouri, (the Hon. T. H. Benton) on his way homeward, at Salem, stated to me that it was then estimated that there were 2,000 persons in Louisville waiting for conveyance to the Mississippi river, and that every means of travelling was engaged to carry passengers to St. Louis, or other points on the river. I speak of this as one case only within my own knowledge, and have every reason to believe that other routes across the State were equally thronged. And it appears to me that, even at a period when the steamboats are in full operation, the time and risk of life which could be saved by travelling on our roads, would enable them effectually to compete with the river communication.

A person from New Orleans, on arriving at the mouth of the Ohio, a point where boats of the largest class can, at all seasons, have safe and easy access, could there take a land conveyance, and arrive at St. Louis, Alton, Peoria, or any other northern point in the State, and at Louisville, in Kentucky, in half the time that it would require a steamboat to ascend in the most favorable stages of water; and the variety of the journey, independent of its expedition and safety, would always present a powerful inducement in its favor.

There is another certain source of revenue, which has generally escaped the attention of writers on this subject, and may, with propriety, be alluded to here. It is the profits arising from the transportation of the United States' mail, which must always be given to the railroads, on account of their superior expedition.

It is well understood that the value of land and its products form the basis of substantial wealth in all countries. If we are to judge of Illinois by this statement, we cannot but admit that the aggregate value of property in the State has greatly increased since the passage of our internal improvement law; and it is equally certain that the markets for produce have been materially improved by the existence and operation of the system.

The character of the State abroad, has been elevated, and, during a season of unprecedented pressure in the commercial world, the bonds of this State have been in demand when other States were unable to effect their loans. The capital which has been brought into the State in a variety of ways, in consequence of the operation of the system, has enabled our people to pass through a perilous crisis in the monetary affairs of this country and of Europe, without depreciation in the value of property, or suffering pecuniary distress. Without intending to anticipate the report of the Fund Commissioners, I have no doubt it will be found that all these happy results have been achieved without a dollar of charge on the Treasury; and I have the fullest confidence that the same energetic and prudent management which has characterised the Board of Fund Commissioners, if persevered in, will enable the State to carry out the system to its full completion without imposing burdens on the people.

In view, then, of all the advantages which the system promises, I am unable to perceive how any substantial objections can be urged against it. If errors or abuses are alleged by any to have been committed in its prosecution, it seems, to my mind, that this forms no substantial objection to the system itself.

The official connection with the system, with which I have been honored, was bestowed upon me without my knowledge or solicitation; I accepted of it with a view of rendering my feeble aid in carrying out the intentions of the law, to the extent of my abilities; and I have found, by experience, that the commencement of the system, in its incipient stages at least, has been a task, to me, of much labor, both of body and mind, whatever may be its operations hereafter.

That I have at all times avoided error, is too much for me to suppose, but that I have endeavored to act to the best of my judgment and ability for the success of the several works under my charge, and, as a member of the Board, for the promotion of the best interests of the whole system, I hope will be conceded to me.

To you, gentlemen, I take this opportunity to make my humble acknowledgments for the assistance and indulgence which you have afforded me on all occasions in the performance of my several duties, as acting Commissioner and President of your Board.

With sentiments of high respect, and the utmost confidence, gentlemen,

Your obedient servant,
WILLIAM KINNEY,
Acting Commissioner of the Second Judicial Circuit.

POSTSCRIPT.

Our delegation in Congress, at the last session, requested me, as President of the Board, to furnish them with a diagram of all the surveys and most probable routes of the different railroads, &c., so that the United States Senate could publish them appended to the journal of the Board and the laws of our internal improvement system; which was complied

with by me, through the aid I received from each member of the Board, by their supplying me with the diagrams; but, in making out the same by the engineer in my office, the diagram of the Great Western mail route was accidentally omitted. My letter to the Hon. A. W. Snyder, on that subject, is herewith submitted. (See letter No. 1.)

It will be remembered that, on a former occasion, the Board authorized me to correspond with Mr. Stansbury, United States engineer, sent out for the purpose of examining and surveying the Kaskaskia and Illinois rivers. On the subject, my letter (No. 2) to him, and a subsequent one (No. 3) to the Hon. A. W. Snyder, are herewith submitted.

I also submit the report of the engineers who surveyed the said river under my directions, together with my correspondence with them on the subject. (See report No. 4.)

I was also authorized, or requested by the Board, to correspond with our delegation in Congress on the subject of allowing this State to import railroad iron free from duty, without the customary formalities of the present law; (see letters Nos. 5 & 6:) and also on the subject of obtaining assistance by donations of land, and grants of the right of way, &c., to carry out the system of internal improvements; which letter (No 7.) is herewith submitted.

No. 1.

INTERNAL IMPROVEMENT OFFICE,
Belleville, April 14, 1838.

SIR: In making out the the diagrams, at your request, of the railroads for publication with the internal improvement law and journals of the Board of Commissioners, the diagram of the Great Western mail route was accidentally omitted by the engineer who drafted or laid down the same, which should, and would have been done, had it not have been for the accident occurring.

The Western mail route, which is of great importance to this country and the travelling community in general, is undergoing, under the authority of our internal improvement system, rapid improvements; which will warrant an early, easy, and safe passage to the mail stage, and all other carriages for the accommodation of the travelling community.

This road passes from St Louis, through Belleville, seat of justice, and Lebanon, St. Clair county; Carlyle, Clinton county; Salem, Marion county; Maysville, Clay county; Lawrenceville, Lawrence county, and thence to Vincennes. By reference to the map of the State, the general features of the route can be seen, which runs through one of the most beautiful and fertile countries, perhaps in the world, of the same extent; and, when the Improvement of the same is finished, a ride in one of the beautiful and newly established stages (which has just commenced running on the same) in the month of May or June through the Grand prairie, &c., would, in my opinion, drive the blue devils as far from a stage passenger as a chase after a gang of buffaloes would from an Indian west of the Rocky mountains.

With great respect, your obedient servant,

WILLIAM KINNEY,

Acting Commissioner of the Second Judicial Circuit.

Hon. A. W. SNYDER, *Washington city.*

No. 2.

BELLEVILLE, August 25, 1837.

SIR: The Board of Public Works, at their last meeting, passed a resolution authorizing me to request of you a transcript of your report of the survey of the Kaskaskia river. A copy of the report of the survey of the Illinois would also be thankfully received by the Board. I herewith send you a copy of the law establishing the internal improvement system of Illinois, which exhibits the manner in which the Commissioners of Public Works are required to make the survey of said rivers, which, however, may be of no service to you, unless your instructions from Government will authorize you to make the surveys, in part or in whole, in conformity to said law.

Very respectfully, I am

Your most obedient servant,

WILLIAM KINNEY,

*Acting Commissioner Second Judicial Circuit
and President B. P. W.*

Mr. ERSKINE STANSBURY,

*U. S. Engineer in survey of the
Kaskaskia and Illinois rivers.*

 No. 3.

BELLEVILLE, February 5, 1838.

DEAR SIR: The Board of Commissioners of Public Works, in June last, passed an order authorizing me to correspond with the United States engineers sent out to survey the Illinois and Kaskaskia rivers, on the subject of their reporting, or furnishing a copy of their report in respect to the examination of the latter river, to me or the Board. Accordingly I did so, and have heard nothing from them.

They are now in Washington city. Erskine Stansbury is the name of the principal engineer sent for that purpose; and should their report be, as it must be, favorable to the improvement of said river, I would thank you to ask of them a copy of the same; and I think it advisable for our delegation to endeavor to get a donation, either in land or otherwise, to aid the State in improving said river, as a company is now making up to build a steamboat to navigate the same.

With much respect, I am truly yours,

WILLIAM KINNEY,

President Board Public Works.

HON. A. W. SNYDER

Kaskaskia River Improvement.

INTERNAL IMPROVEMENT OFFICE,

Belleville, July 17, 1837.

HON WILLIAM KINNEY,

Acting Com'r Second Judicial Circuit.

SIR: In compliance with the request in your letter to me of the 1st, and the instructions of the principal engineer of the southern engineering district, of the 8th, I commenced on the 13th of last month, at Vandalia, with the engineering party, in the two light boats which you had prepared for the purpose, to make the necessary examinations and surveys of the Kaskaskia river, with a view to the adoption of plans for the improvement of its navigation, and completed the same on the 7th inst.

According to the instructions, I procured copies of the several township plats through which the river runs, to enable me to identify with sufficient accuracy the location of the several points where obstructions exist, and which it was necessary to note, without the expense of meandering the whole course of the river. It is to be regretted, however, that, in executing the surveys of the public lands of the United States, some portions of the river were not meandered. And although the river is protracted through all the sections, and wherever the lines intersect or touch the river, the points are accurately drawn, yet the serpentine course of the river from line to line are only ocular drawings.

In the instructions, I was referred to the 18th section of the internal improvement law, and required to adopt such plans for the improvement of the navigation of the river as contemplated by that act, but at the same time others might be embraced so as to have a more extended appropriation than that now made. Consequently, my examinations and surveys were made with a view to steamboat, keelboat, and flatboat navigation from the mouth of the river upwards, giving the low water channel in the river, at the shoalest places, a convenient and uniform depth for the uninterrupted passage of keel and flatboats, and of steamboats of such dimensions as maybe best adapted to the navigation thereof, and for the removal of such timber obstructions as may be deemed injurious or dangerous to the navigation—having a due regard, also, to the greatest and most useful amount of water-power to be created or rendered for the use of the State, and to equalize the expenditure of the sum appropriated, as near as may be, on all portions of the river susceptible of improvement from its junction with the Mississippi upwards, by removing the obstructions from its channel, in making short cuts across the bends, and clearing off the trees from the margin of the river.

The instructions further require of me to divide the proposed improvements into convenient sections for putting the work under contract whenever I found it to be practicable to make detailed estimates, descriptions, and specifications, so as to enable persons proposing to contract to bid understandingly for its execution.

In regard to the capacity of the stream for navigable purposes, various opinions have been expressed. The General Assembly, by an act passed

on the 20th February, 1819, declared it a navigable stream from its mouth up to township No. 7 north. Subsequently, by another act, commissioners were appointed by law, and an appropriation and some expenditures were made for improving the navigation, which were applied principally below Carlyle; but the small amount appropriated, and consequently the little work done, did but little to improve the condition of the river in the navigation.

The source of this river is in Champaign county, and it may be termed *the river of the prairies*. Its general course is from N. E. to S. W., stretching diagonally almost across the State through an extensive prairie region of great fertility and beauty. It is a stream of considerable length, and is very sinuous in its course, and much resembles at a common stage of water, a canal obstructed only by timber and snags, which, when removed, and in some places straightened by opening cut offs across the points, it must become an important stream for navigation. And it seems to me that in an impartial consideration of the subject of making the necessary improvements, the burden ought not to rest wholly upon the present means of the State. It is known that at the present time the United States own four-fifths of the lands contiguous to this river; and unless the navigation is improved to afford facilities for transporting the surplus products of these fertile lands, they must remain for a long time the property of the General Government. Would it not be good policy on the part of the National Government to donate alternate portions of the contiguous vacant lands to the State, to aid the State in raising the necessary funds to extend the navigation of this river? The example of the donation for a like purpose, near Chicago, is so well known as having produced an income to both Governments, that it is only necessary to be alluded to, to make it manifest in this case.

To ascertain the capacity of the river, at the point of commencing my examinations, I took a survey and levelling above and below the mill dam opposite Vandalia. The stage of water at the time (13th June, 1838,) was about eight inches above the lowest known water mark. The least depth of water in the channel below the dam was four feet and four-tenths; the medium width of the surface of the water ninety-eight feet; the rise from low to high water marks 11.285 feet; the quantity of water discharged per hour, 1,847,799 cubic feet.

The surveys of the public lands afford a convenient and beautiful application of science to the geography of the country, chequering it into sections of a mile square. In making my notes and estimates, the examinations and surveys, I was governed by the sectional lines through which the river passes, and also in making the estimates of distance. These river estimates of distance governed the estimates of cost of removing the timber and snags, and the cost of clearing the timber along the banks. Should it be deemed expedient at any future time to put the execution of the proposed improvements under contract at a public bidding, it may be easily divided into suitable contract sections by the details given of the river through the several sections of the public surveys.

It will appear by the notes and estimates herewith returned, that the actual distance along the river, as unimproved, from the mouth up to Vandalia, is 204 miles and 70 chains; and that, when improved as proposed, the distance will be lessened 24 miles and 20 chains by means of cut-offs,

making the distance, when improved from Vandalia to the mouth, 180 miles and 50 chains.

The notes, estimates, and profiles exhibit the following estimated cost:			
For removing logs, &c., in the river	-	-	\$7,734 77
clearing of river banks	-	-	7,792 02
removing the timber of two rafts	-	-	400 00
clearing sand islands, willow points and clearing			
timber from cut-offs	-	-	1,150, 00
making brush dams	-	-	796 00
excavating cut-offs	-	-	1,564 00
			<hr/>
Total	-	-	\$19,536 79

These estimates of cost were made with the understanding that the work was not to be executed by contract, but that it would be done under the immediate direction of a superintendent or agent. The reasons which influenced that understanding are, that it will require an outfit for a snagboat, suitably constructed for that purpose, with the necessary tackle and apparatus for removing the logs and snags in the bed of the river, which would cost more than it is probable a contractor would be likely to incur, unless he undertook the whole, or a major part of the work—and it would be difficult so to define the work in a manner that an undertaker could form any correct estimate how to bid, or be bound to the performance of it in the way it would be required to be done by an inspecting engineer; and that it would require the constant attention of an engineer and assistant superintendents during the whole time of performing the work, to direct the manner, and see that the work was effectually executed, which could not be specified understandingly on paper. Taking this view of the mode of executing the work, the additional expense of the boat, apparatus, and requisite tools; and also adding some additional cost which will have to be made for sluices and wing-dams to concentrate the water in a few places into a main channel, which a rise in the river at the time of making the examination prevented us from laying off and making an estimate for—it is probable that the whole, exclusive of locks and dams for slack-water, will not exceed the sum of thirty thousand dollars.

The best plan, therefore, that I feel safe in recommending to you for executing that work, is to procure a suitable snagboat, with the necessary tackle, tools and implements and employ about forty suitable laborers, under the charge of a superintending engineer, with two experienced superintendents of the work, and furnishing the necessary subsistence. A part of these laborers to be engaged in cutting, sawing, and removing the trees and snags in the river, and the rest in chopping down and cutting off into short lengths all such trees and brush as hang over the river; and cutting away all roots, stumps, and other things likely to stop or arrest floating timber, and prevent the formation of drifts or rafts; grubbing up the willows and shrubbery on the islands, and, as far as may be deemed necessary, remove every thing that would be considered likely to obstruct the passage of navigating vessels; and removing such trees as are likely to wash down and fall into the river on each bank; and excavating the earth to make the cut-offs across the points and bends referred to in the notes.

When the river is cleared in the manner suggested, and the cut-offs made, no reason can be perceived why this river may not be safely navigated as far up as Vandalia by steamboats, drawing not more than three feet of water, at least six months in a year; and flat and keels, drawing not more than that depth of water, might pass nine months in a year. I am certain that such might have been the case for the last four or five years, had the river been improved as now proposed: and it is believed that the river may be further improved so as to make it navigable for keel and flat boats up to Shelbyville and above; and, indeed it has been remarked by many intelligent persons, that the quantity of water in this river has greatly increased since their knowledge of it; and they attribute it to the settlement and cultivation of the lands, which opinion is not confined to this river, but that it has become notoriously so with many other water courses in the western country since its first settlement and cultivation.

Whatever surplus of the present appropriation may be left in improving the river below Vandalia, can be applied in improving the river above, as far as it is susceptible, and the surplus funds appropriated may afford the means. This may be greatly facilitated by having the snag-boat and materials on hand with which to prosecute it.

The best season for prosecuting the proposed improvements, is from the 1st of September until the setting in of winter. During the winter season, little could probably be done, as the days are short—the probability that the river will be frozen over, and the weather too uncertain to keep laborers on wages to any advantage; and in the spring season, the frequent high rises would overwhelm the timber lying in the river, and inundate the shores so that all operations would be very liable to be repeatedly suspended until after the spring and summer floods subside. Should the plan of operations herein recommended meet with your approbation, it would be proper to draw out a plan and estimates for the boat and other equipments required, as early as practicable, as the proper season for operations is fast approaching.

I would here remark, and recommend, that steamboats intended to navigate this river should be so constructed as not to exceed 100 feet in length, and built considerably flat-bottomed, with a stern wheel in a recess. Such a boat would not probably exceed three and a half or four feet hold, and when loaded with sixty tons of freight, would not draw more than three feet of water. There are a great many short bends in the river, where it would be difficult for a boat differently constructed, when running fast, to turn round the bends without running against the banks. The greatest danger which I apprehend in navigating this river would be in time of high water. The water then, in many places, runs over the banks and through the timber, and across the bends, and it would then be difficult to prevent a boat from being drawn by the current over the bank into the woods.

In regard to the improvement of the river by means of slack-water dams, and procuring the most useful amount of water power to be created or rendered thereby to the State use, and the subject of mill-dams, bridges and viaducts, I refer you to the remarks and recommendations in the appenpix to the notes and estimates herewith submitted, considering any remarks upon these subjects, under present circumstances, to

be of a confidential character, and ought not to form a part of this general report.

Among the many great advantages likely to be gained by the improvement of this river, there are two worthy of remark: 1st. It will cheapen and facilitate the exports and imports of the people composing a considerable portion of the interior part of the State. 2d. It will bring into use and market large quantities of valuable timber which it would otherwise be difficult to get at.

It is a fact, generally admitted in the construction of works of internal improvement, that railroads and turnpikes afford the greatest facilities for rapid travel, and are best calculated for the transportation of light articles of commerce; and that sea, river, and canal transportation is cheaper, and best calculated for the transportation of heavy articles of commerce.

The greatest portion of exports and imports carried on by the people residing on the waters of the Kaskaskia river, is to and from St. Louis, Alton, and Chester. The price which merchants have to pay for wagonage from the Mississippi to Vandalia and Shelbyville, is from one dollar to one dollar and fifty cents per hundred pounds, or from twenty to thirty dollars a ton. At Carlyle, and vicinity, the price is about fifteen dollars a ton; and the other towns further down the river have to pay in proportion to the relative distance they are from the Mississippi. The distance from Vandalia to St. Louis is seventy miles. A keelboat, loaded with thirty tons of freight, could be propelled from Kaskaskia or Chester to Vandalia, by twelve hands, in ten days; these hands, including provisions, would cost about one dollar and a quarter a day each, making fifteen dollars a day expense for ten hands, equal to one hundred and fifty dollars for the voyage. Now, at the above rate of wagonage, this freight would amount to six hundred dollars, at least. A steamboat could afford to do it for much less than a keelboat; consequently, it is evident that all the heavy exports of produce would be carried on by the river, in steam, keel, or flatboats, and all the imports of groceries, salt, iron, &c., for the common consumption of the country, would be taken up by steam and keel boats, making a good profit on their voyages, vastly under the charges of wagonage. And the great abundance of timber would form an important article for consumption, as well to the contiguous prairies as for rafting to the waters below, where it would command a price and profit worthy of the enterprize of the people.

All of which is respectfully submitted.

I have the honor to be,

Very respectfully, your obedient servant,

WM. C. GREENUP,

Principal Assistant Engineer, Kaskaskia River Improvement.

My views accord with those in the above report, in regard to the practicability of the improvement, and the great advantages that will result from the same.

Respectfully,

SAMUEL BROOKE, Jr.

Assistant Engineer Kaskaskia River Improvement.

INTERNAL IMPROVEMENT OFFICE,
Belleville, July 24, 1838.

Col. WM. C. GREENUP,

SIR: Your report has been received, and it is with pleasure that I take this occasion to express to you, and those who accompanied you in the performance of the work in the survey of the Kaskaskia river, my entire satisfaction of the despatch with which the same was performed, and the ability and satisfactory manner in which your report explains the utility and practicability with which the navigation of the said river can be improved to the great advantage, especially of the citizens of Randolph, St. Clair, Washington, Clinton, Fayette, and Shelby counties; the good citizens of which cannot fail to be much gratified to learn that the time is fast approaching when keel, flat, and steamboats will be laden and unladen, both with the exports of their produce and the imports of commodities in exchange for the same, at the very door of many of their houses, and the villages which are and naturally will be stationed upon the banks of that ancient river, which has been so much overlooked by emigrants, and misrepresented (as to its navigation) by those whose *pretensions to science* were worthy of more correct views.

Your plan for improving the said river by superintendents, under the direction of a skilful engineer, meets my approbation, and will (barring accidents, if the stage of the water will permit) be put in operation by the first of September.

With sentiments of respect,

Your obedient servant,

WILLIAM KINNEY,

Acting Commissioner Second Judicial Circuit.

P. S.—I have no doubt but that the time will yet come when this subject will be placed in its proper light, in the halls of Congress, to that most honorable and enlightened body in the world, in a manner in which they will see the propriety, and have the magnanimity to grant to this State, either by donation of lands, or otherwise, an assistance for the improvement of that river, which, as I have before stated, was named after one of the “most patriotic and peaceful tribes of Indians, perhaps, that ever lived west of the Allegheny mountains;” of which the celebrated, talented, and great chief (*Baptiste Du Coigne*) named a son after Thomas Jefferson, as an evidence of his respect for the principles of our Government.

W. K.

No. 5.

Copy of a letter written to each of the members in Congress from this State.

BELLEVILLE, January 20, 1838.

SIR: By a resolution of the Board of Public Works at their last meeting, I am requested and authorized to open a correspondence with our members in Congress, in respect to obtaining the passage of a law by that honorable body, to allow the Board of Public Works to have railroad iron for the internal improvement system of the State of Illinois imported free of duty. I beg leave, therefore, to call your attention to the subject; and notwithstanding there may be a general law now on that subject, *as some say there is*, yet you will see the propriety of a special law for our State, as our system of improvements is organized in a

manner to warrant safety to the Government, and put beyond doubt the purposes for which said iron would be imported by an agent of the Board, or on which a drawback would be allowed, if purchased in the United States, and thereby save the trouble of a compliance with the formalities that are generally thrown round a general law on such subjects, to guard against individual or company irresponsibilities.

Any information, therefore, as to the practicability and possibility, in your opinion, of the prospect of the passage of such a law, will be more than thankfully received, by

Your obedient servant,

WM. KINNEY,

President of the Board of Public Works.

No. 6.

INTERNAL IMPROVEMENT OFFICE,

Belleville, March 1, 1838.

DEAR SIR: Your letter of 5th ultimo, enclosing me a section of the law in relation to the importation of railroad iron, has been received, and the said section carefully examined. As our system of improvements adopted by the State is large and spacious, and will no doubt be carried into successful operation in due time, and as no doubt can be entertained of the full faith and intention of the State to use the iron imported under the direction of the Board of Public Works for said road purposes, it would therefore still appear to me that a special law of Congress, allowing an agent of the Board liberty to purchase or import all iron free of duty, intended as aforesaid, would be nothing more than reasonable, and a saving of considerable trouble to the Board, or agent, which they would be put to by a compliance with the formalities of the law as it now exists; and also the lying out of the use of the money paid until the iron was actually laid down on the rails. Certainly that enlightened and most honorable body, the Congress of the United States, cannot, or at least would not, if respectfully applied to, refuse to give some special encouragement to a young and patriotic State, which, like the State of Illinois, has, in a bold and enterprising manner, stepped forward to establish a system of internal improvements, which, if carried out to the full extent of the suitability of such a system to the nature of her soil and geographical situation, will not only be a credit to the nation to which she is a birth child, but also cause her to shine as the morning star amongst her sisters in the far west.

With respect, your obedient servant,

WILLIAM KINNEY,

President of the Board of Public Works.

Hon. J. M. ROBINSON.

No. 7.

INTERNAL IMPROVEMENT OFFICE,

Belleville, February, 1838.

DEAR SIR: As Illinois has, at her last regular session, established, perhaps, one of the grandest and most splendid schemes of internal improve-

ments ever adopted by any State, and which is well suited to her locality, agricultural advantages, and the commercial necessities of the country, I would therefore suggest the propriety of the members in Congress from this State asking, from the General Government, a donation on each alternate section of the undisposed lands along all the projected improvements aforesaid; not only for the benefit of the State, but to facilitate the sale of the Government lands lying in the vicinity of said projected improvements, both of rivers and railroads, and particularly to aid in the completion of the great Central railroad, commencing at the mouth of the Ohio river and connecting with the Michigan and Illinois canal. Such a donation would be carrying out, to perfection, the same principle of national policy that actuated them to grant certain lands to aid in the construction of said canal, as the railroad connected with the same will open a grand chain of intercourse, in a commercial, agricultural and military point of view, with the northern, southern, eastern and western States. To such an improvement as that, the utility of which needs no comment, certainly no member of Congress could object, or refuse the aid of the General Government in carrying it out. It is useless, I presume, to say that Illinois is naturally destined to be the garden spot of the world, as respects agricultural pursuits. Her soil is alluvial, and groaning to be delivered, by the hand of the industrious agriculturist, of the immense wealth which it contains. She is a railway by nature, at least so far finished as a wagon wheel would be lacking only the tire, comparatively speaking, with other countries where railroads have been and are yet intended to be successfully and usefully constructed. What objection can the General Government have to give aid to such a system of internal improvements as Illinois has adopted, so suited to her in every point of view, and which, if successfully carried out, will place the whole system of national, agricultural, and military operations before the eyes of the world, in the attitude and beauty in which a lovely belle would appear before a large mirror?

It would appear to me that all that is wanting to obtain aid in the accomplishment of such a desirable object, both for the nation and this State, is to make an effort. A moment's reflection, by that most honorable body (of all national councils) the Senate and House of Representatives of the U. States, is only required to push the projected improvement, particularly that of the Central railroad, into complete operation; (the accomplishment of which will make the mouth of the Ohio and Mississippi accessible at all seasons of the year;) by which means the whole products for exportation can and will be thrown into market and scattered to the four quarters of the world, without being subject, as is frequently the case, to meet the competition of other States at the city of New Orleans, which have been prevented in the forwarding of their exports, either from the want of water or by being retarded by ice.

Your early attention to this subject will be well received by the Board of Public Works, and no doubt by the whole community which you represent, and more particularly by your correspondent and

Humble servant,

WILLIAM KINNEY,

President of the Board of Public Works.

Hon. A. W. SNYDER.

AN ABSTRACT of the contracts let on the Western Division of the Great river, and the east

	Length in miles.	Contractor's names.	Date of contract.
<i>West from Belleville.</i>			
Section No. 1 - - -	2.00	Hugh Duffy,	Aug. 28, 1837
Bridging over Richland creek - -	-	Same	Oct. 5, 1837
Section No. 2 - - -	4.00	Patrick Ryan	Feb. 19, 1838
" No. 3 - - -	2.00	John Thomas, jr.,	Aug. 28, 1837
American } No. 4 - - -	2.00	Winstanly & Duffy,	do.
Bottom } No. 5 - - -	2.00	John Thomas, jr.,	do.
} No. 6 - - -	2.50	Winstanly & Duffy,	do.
<i>East from Belleville.</i>			
Section No. 1 - - -	2.00	Dunn, Dwin & Co.,	Feb. 19, 1838
" No. 2 - - -	2.00	Same	do.
" No. 3 - - -	2.00	M'Cormick & Breman,	do.
" No. 4 - - -	2.00	Same	do.
" No. 5 - - -	2.00	John Thomas & Co.	do.
" No. 6, Silver creek bottom	1.00	Same	Oct. 15, 1837
" No. 7, Silver creek bridge	-	Same	do.
" No. 8, Lebanon -	2.00	Same	Feb. 19, 1838
<i>East from Lebanon.</i>			
Section No. 1 - - -	6.00	Mullegan & Co.	Aug. 16, 1838
" No. 2 - - -	4.00	Dunn & Co.,	do.
Sugar creek bottom - - -	2.00	Same	Feb. 19, 1838
Sugar creek bridge - - -	-	John Thomas, jr.,	Oct. 23, 1838
Section No. 3 - - -	7.00	Dunn & Co.,	do.
Shoal creek section - - -	1.00	Baine & Wadkins,	Feb. 19, 1838
Section No. 4, Shoal creek bridge	-	Ferdinand Baine,	Oct. 23, 1838
" No. 5 - - -	4.00	M'Cormick & Co.,	Aug. 16, 1838
" No. 6 - - -	4.00	Same	do.
Beaver creek section - - -	1.00	Isaac Demint,	Aug. 28, 1837
Carlyle section - - -	1.00	Groves & Schaffer,	Feb. 19, 1838
Kaskaskia bottom - - -	1.00	Same	do.
Sections No. 7 & 8, Grand Prairie	21.00	Ferdinand Baine,	Oct. 23, 1838
" No. 9, 10, 11, 12, 13, & 14	14.00	Fitch, Case & Co.,	Aug. 16, 1838
Dun's creek section - - -	1.00	Albright & Rodgers,	Oct. 7, 1837
Whole length of Mail Route -	152	-	-

A.

Western Mail Route, between Illinois town, on the left bank of the Mississippi line of Marion county.

Engineer's estimate.	Amount of work actually done to December, 1838.	Probable amount of work to be executed.	Amount of per centage paid.	
{ \$2,350 45	\$5,876 60	-	\$5,876 60	{ Finished and recorded
2,698 08	5,050 85	-	5,050 85	do.
3,473 37	See section 5	-	See section 5	do.
14,170 00	2,251 80	\$14,000 00	1,688 85	
2,150 00	5,498 10	-	5,498 10	Finished and recorded
10,478 00	3,820 90	-	2,865 70	
3,182 81	{ 7,378 93	-	6,903 00	
1,448 61	{	-		
1,131 17	{ 4,789 00	-	4,345 12	
2,006 64	{	-		
1,530 88	2,070 86	-	2,070 86	Finished and recorded.
4,549 75	6,642 00	-		
856 00	1,000 00	-		
430 05				
1,640 80	Commenced			
2,010 84	Commenced			
3,594 00	2,125 00	-	1,700 00	
1,700 00				
1,476 00	Commenced			
1,965 11	3,308 34	-	3,308 34	Finished and recorded.
3,512 00	Commenced			
1,782 80	do.			
801 64	do.			
1,756 00	3,408 47	-	3,408 47	Finished and recorded.
{ 4,000 00	3,501 69	-	2,636 20	
2,364 60	Commenced			
8,616 40	Commenced			
-	1,051 70	-	1,051 70	Finished and recorded.
\$85,466 60				

Report of Edward Smith, Principal Engineer of the Southern District.

VANDALIA, December 3, 1838.

To the Hon. WILLIAM KINNEY,

President of the Board of Commissioners of Public Works.

SIR: I have the honor to submit to the Board of Public Works the following report, in relation to the several public works in the southern engineering district, showing their situation and progress up to this date.

SOUTHERN CROSS RAILROAD, FROM ALTON TO MOUNT CARMEL.

The graduation of the road-bed of the western and eastern divisions of this work, which was placed under contract in the months of February and March last, has been efficiently prosecuted, in the general, and is in a state of forwardness that gives a reasonable assurance of the final completion of this part of the work within the time limited in the contracts. The jobs recently let at the crossing of the Kaskaskia river, at Carlyle, and at the crossing of the Little Wabash river, in Wayne county, have been efficiently commenced by the contractors.

The contractor to whom was let the job of delivering the timber for the superstructure of the railway on the eastern division, commenced his contract in due time, but has been unfortunately retarded in his operations in consequence of the unusual drought which prevailed during the past season. A steam-engine, purchased in Ohio for the purpose of erecting a saw-mill, could not be shipped to its place of destination, and the water-mills upon which he relied for a portion of his supply of timber have been unable to operate. The hope is entertained that, so soon as these unavoidable causes, which he alleges have delayed his operations, are removed, his assurances, still to complete his contract within the time limited, will be fully redeemed.

The new contractor to whom was relet the superstructure of the railway on the western division, in the month of October last, has made arrangements to carry his job efficiently forward, and the utmost confidence is felt that he will give satisfaction to the Board, and to the community interested in the work.

The situation and progress of the several contracts are exhibited in detail in the tabular statements prepared for the purpose, and herewith submitted.

The detailed reports, estimates, and drawings upon which the several lettings have been had, and heretofore attested and filed, are respectfully referred to as exhibiting a full and minute description of these portions of the line.

The maps and profiles of the remaining portions of this line, explanatory of the experimental surveys, as well as those of the Belleville and Lebanon Branch railroad, are herewith submitted.

A considerable portion of the examinations and surveys of this road, from the Wabash westerly, were made in reference to a grade not exceeding thirty feet to the mile, and the residue of the line, including

the Branch road, in reference to a grade within forty feet. By a subsequent order of the Board, this original restriction was removed, and by adopting a grade above forty feet, but within admissible limits, at a few points where increased difficulties are presented, the original experimental lines will be greatly improved in point of distance, curvatures, and cost, without affecting the general utility of the road. The total length of the experimental line, from the bank of the Wabash to the bank of the Mississippi rivers, is 153 miles; but it is found that, by resorting to the modification in the grade above suggested, this distance can be reduced within 147 miles. The greatest elevation overcome is 220 feet above high water mark of the Great Wabash river, at the foot of the Grand Rapids, and 203 feet above high water mark of the Mississippi, at the city of Alton. This maximum elevation of country occurs on the dividing ridge between the waters of the Wabash and Kaskaskia rivers, in the county of Marion; and nearly the same elevation presents itself on the western extremity of the valley of the Kaskaskia, near the town of Edwardsville. The drainage of the whole State is intersected by this line of road nearly at right angles, and the profile will be found useful to the intelligent settler in seeking for a home on the lands of the General Government in that section of the State, should it be thought that the health of countries is governed by comparative elevation.

The river sections of this work between the city of Alton and Edwardsville—between Mount Carmel and Albion—and at the crossings of the Little Wabash and Kaskaskia rivers, now under contract, embrace the heaviest and most expensive portions of the road. It will be seen by the map, that a large portion of the residue of the line traverses an open prairie country, and its topography presents no extraordinary difficulty to the most economical construction of the road-bed. The average cost of the whole line, estimated upon data derived from the actual lettings and prosecution of the present contracts, and upon the present price of labor and provisions, is \$8,200, per mile for the main line. The Belleville and Lebanon Branch road presenting less difficulties than the main line, is estimated, upon the same data, at \$7,000 per mile. Its total length from the town of Belleville to its intersection with the main line, near Highland, is 23½ miles.

As capital becomes invested in the country and mills erected, the facilities of furnishing the timber for the superstructure of the railways and bridges will be greatly increased, and must materially reduce the cost of this part of the work. The supply of timber from the rivers where the road is commenced, and which it crosses in its route, may be considered inexhaustible; and when the machinery for its manufacture shall have been provided at those points, its cost must be lessened to an amount at least equivalent to the expense of transporting it on the railways to the interior of the State. So that it is fair to conclude that the cost of construction, as now estimated, will be found to be adequate and sufficient for the entire extension of the railways throughout the whole line.

ALTON AND SHAWNEETOWN RAILROAD.

The contracts for grading the Shawneetown division of this road, which were let in the month of March last, have been efficiently prose-

cutted, and the roads will no doubt be ready to receive the railway within the time prescribed in the contracts. The contracts for furnishing timber for the superstructure of the railway and bridges, and those for the erection of the depot buildings at Shawneetown and Equality, let at Shawneetown in September last, have been commenced, and the contractors are considered highly efficient and responsible. The prices at which the work on this road has been taken are lower, in the general, than those of any other works in this district, and perhaps in the State. This is to be accounted for from the superior advantages, which exist at this well known and important emporium on the Ohio river, in obtaining laborers and provisions; and it affords a most encouraging inducement for the rapid extension of the work into the interior from this point. Added to the above advantages, the liberal policy pursued by those having the control of the large banking capital at that point will, at all times, enable contractors to carry on their works with efficiency, certainty, and economy, and at the same time advance the best interests of the State in promoting the speedy and economical construction of her public works.

The contracts, embracing the graduation of three miles at the crossing of Silver creek, in St. Clair county, which were let at Belleville in October last, have fallen into the hands of responsible contractors, and the jobs have been efficiently commenced. The tabular statement, herewith furnished, will exhibit the present condition of these contracts.

The experimental survey of the whole line from Shawneetown to the intersection of the Alton and Mount Carmel road near Edwardsville, was made during the last season, and completed in the month of September, by Mr. Lathrope, the engineer on this road. Owing to the decease of Mr. Blanchard, the resident engineer, and the sickness of the assistants on the line, Mr. Lathrope's duties have been greatly augmented; and, in consequence, his report of this survey has been unavoidably delayed.

The distance by the experimental line, from Shawneetown to Edwardsville, is 147 miles. As the general character of the country is similar to that on the route of the Alton and Mount Carmel road, the cost of its construction will not exceed that of the latter, or \$8,200 per mile. The report of the engineer in charge of the work is in a course of preparation, and will be submitted as early as practicable.

ALTON, HILLSBOROUGH AND SHELBYVILLE RAILROAD.

At the session of the Board in the month of June last, this work was transferred from the western to the southern engineering district. At the time of its being so transferred, the examinations and experimental surveys were in progress, under the direction of Mr. Hawn, the senior assistant engineer in charge of the work. As it was desirable that the portion of this work then ordered to be placed under contract should be prepared for letting at the earliest day possible, Mr. Hawn was forthwith instructed to suspend the experimental surveys east of Hillsborough, and proceed immediately to the definite location of the western division of the work, and to prepare the same for letting. The topography of the country, on the direct line between Upper Alton and Hillsborough, presented extraordinary difficulties to the location of a useful and econom-

ical railroad, and consequently required that elaborate and skilful examinations should be made, in order to determine on the most judicious route to be adopted.

The line having been decided on, and the drawings and estimates prepared, the work on the first 13 miles from the city of Alton was let at Belleville, on the 22d of October last. The contractors, without exception, so far as I am informed, are considered to be highly responsible, and every confidence is felt that the work will be energetically prosecuted.

For further and full particulars in relation to this portion of the line, I beg leave to refer to the able and comprehensive report of Mr. Hawn, and the accompanying drawings and estimates heretofore filed.

The experimental lines have subsequently been extended to Shelbyville, but sufficient time has not elapsed to enable the engineer to prepare his report, to lay before the Board at their present meeting.

GREAT WESTERN MAIL ROUTE, BETWEEN VINCENNES AND ST. LOUIS.

The contracts let on this line of work have, with few exceptions, been as efficiently prosecuted during the past season as existing circumstances would admit. It will be recollected that the heaviest and most important jobs on this road occur in situations attended with more than ordinary difficulties in the prosecution of the work; and, at two points at least, are subject to periodical inundation. The extreme and continuous high waters in the spring and early part of summer arrested the progress of the work on the Purgatory and Little Wabash divisions; and the severe sickness at these points, as well as on the American Bottom division, which shortly afterwards prevailed, tended much to delay and almost to prostrate the operations of the contractors. After the sickness had subsided in the fall, the contractors at the two former points, and mostly on the whole line, excepting on the American Bottom, made a vigorous resumption of the work, and have, for the most part, urged forward their respective jobs with a reasonable degree of energy.

The tabular statements herewith submitted exhibit, in detail, the situation and progress of each respective contract on the whole line, and to which I respectfully refer for further information in relation to this work.

The experiment so far made in prosecuting the work at the Purgatory, Little Wabash, and American Bottom divisions of this road, is sufficient to show that the specific appropriations to be expended on these points are not sufficient to complete the work in the best and most substantial manner. The accumulated travel and transportation on the American Bottom division, which is now immense, and which must rapidly increase with the growth of the city of St. Louis, give intimations, which cannot be misunderstood, that the best interests of the State, as well as of the community immediately interested in the work, would be best consulted by making this portion of the mail route a road of the most perfect character. The same remark is strictly applicable to that portion of the line between Lawrenceville and Vincennes, commonly called the Purgatory division. It is therefore to be hoped that the Legis-

lature may be induced to afford the means of making the three important points above named as perfect as the importance of the road demands.

A considerable portion of the Purgatory division of the road is subject to inundation, from the circumstance of the Great Wabash river overflowing its right bank, some distance above the road, at a point called Bellegrave, and discharging a considerable portion of its volume of water over the extended low prairie, which has received the appellation of "Purgatory swamp." For a considerable time during the freshets of the Wabash river, this low prairie is inundated for many miles in extent, and the embankments are consequently much exposed, for weeks together, to the wash and waves of this wide-expanse of water. In order to make a road of any permanency, the embankments must be protected from this annual cause of injury and destruction; which will very materially increase the cost of the work. In my opinion, the best mode of protecting this work would be to construct an embankment or levee at Bellegrave, and exclude the river from the prairie. It is entirely practicable to effect this valuable improvement at small comparative cost. A large tract of valuable and fertile arable land would be reclaimed by it, and the health of the country greatly improved. As much of this land now lies unoccupied and in the hands of the General Government, and perhaps will so remain until this improvement is made, it is fair to presume that proper representations, made to the authorities at Washington, of the situation of these lands, would induce a grant of at least a portion of them to the State, to promote this very desirable object.

KASKASKIA RIVER IMPROVEMENT.

For information respecting the situation and progress of this highly important improvement, I beg leave to refer the Board to the full and detailed report of Col. Greenup, the principal assistant engineer on the work, who has been specially charged with the operations on this improvement, under the immediate instructions of the acting Commissioner.

LITTLE WABASH RIVER IMPROVEMENT.

My special report in relation to this improvement, made to the acting Commissioner in charge, in the month of November, is respectfully referred to, as containing all the information in regard to it, which was in my possession, up to that time. Subsequent to the date of that report, and up to the present time, the superintendent on the river charged with the removal of the timber obstructions, has been successfully operating with a party of energetic workmen; and if the river should keep down at its present stage for a month longer, and the operations are not too much retarded by the inclemency of the weather, as much cutting and clearing will have been done as it might be prudent to do in any one season of low water.

The superintendent has necessarily been made the disbursing officer on the work, and he is now present at Vandalia for the purpose of exhibiting his accounts for disbursements, and having them passed by the acting Commissioner; I, therefore, respectfully refer the Board to the report of the acting Commissioner for all information in regard to the expenditures on this work.

Having thus, in as concise a manner as possible, attempted a description of the practicability, probable cost, and present progress of the public works in the southern engineering district, so far as I have data in my possession, I will beg leave to submit a few remarks in reference to their general utility and probable prospects of producing a revenue to the State.

The Southern Cross railroad, from Alton to Mount Carmel and Shawneetown, traverses a country which presents a peculiar adaptation to agricultural pursuits, and is certainly calculated to sustain a very dense population. Deprived, however, as it is by nature, of those natural channels of communication with which the exterior and some portions of the interior of the State are so bountifully provided, its settlement has been retarded, and the advantages of its soil, its climate, and its valuable distribution of timber and prairie, have been, heretofore, measurably overlooked. But since these lines of communication with the navigable borders of the State have been projected, the country has risen in public estimation, and immense entries of the public lands, by emigrants and actual settlers, are rapidly being made. To show that these results are directly attributable to the prospect of these lands having an outlet to market, I will mention one fact tending to prove this position. It is this—that the settlement of the southern portion of the State, and particularly the entry of the public lands, are made, to the greatest extent, along our navigable rivers. There is not at this time, as I am informed, a single fraction of land lying vacant, from the falls of the Great Wabash, to the mouth of the Ohio river, which touches those streams; and it is well known that a considerable portion of the lands along this extensive river front is subject to occasional inundations and other obvious disadvantages. If, then, the advantage of having a communication to market is of so much importance to these lands, what may we not anticipate from those artificial lines of communication which afford an outlet for the produce of those beautiful and healthy prairies, so eligibly interspersed with groves of timber, and which hold out every inducement for their settlement by the industrious and intelligent agriculturist? From my own observations during the last two years, I have the gratification to believe that the settlements along and contiguous to the lines of these railroads will be exceedingly compact in a very short period, and that an immense amount of the heavy staples of the country—as grain, pork, and tobacco, which will not now bear transportation, on common roads, to market—will seek that market through these channels as fast as they can be constructed. In addition to these sources of revenue, the indispensable articles of consumption will be transported over these roads, from their emporiums on the Ohio, the Mississippi, and the Wabash, to supply the whole interior. Another source of immense revenue to the State, and of incalculable benefit to the citizens throughout the interior, is to be anticipated from the transportation of the salt manufactured near, and which must pass over the Shawneetown and Alton railroad. This source of business for this road alone, and disconnected with the immense amount of agricultural products and of travel which must pass over it, indicates, beyond a doubt, that this is one of the most important branches of the public works, both in point of productiveness and general utility.

The Southern Cross railroad to Mount Carmel having, in common with the Shawneetown road, the cities of Alton and St. Louis as one of its termini, and the immense water-power at its junction with the Wabash river, cannot fail to command its due share of transportation of produce and merchandize. In addition to this, it forms a part of a projected chain of intercommunication from the Mississippi river, via Louisville, Kentucky, to Charleston, South Carolina. If the amount of travel and transportation at this time, (to say nothing of its prospective increase,) which passes between the cities of Louisville and St. Louis, and via St. Louis to the upper cities and towns on the Mississippi, Missouri, and Illinois, by steamboats and otherwise, and which this overland communication must come into fair competition for, at all seasons of the year, and engross the whole of it during low water and ice, be taken as a basis of calculation, no one will pretend to doubt that this road will be largely productive of revenue. The connecting link in Indiana, 115 miles in length, which the Mount Carmel and New Albany Railroad Company has a liberal charter to construct in connection with the State of Indiana, has, at the last session of Congress, received the most favorable consideration of that body, and no doubts can be entertained of its simultaneous construction with the road in Illinois. At a point seventeen miles east of Mount Carmel, this railroad will intersect the great Central canal of Indiana, which extends from Evansville to the Maumee bay, on lake Erie. This line of communication to the lakes and New York is looked to with increasing interest by the citizens of Louisville, and will no doubt be duly appreciated by the citizens of southern Illinois.

The Alton, Hillsborough and Shelbyville railroad also terminating, at one end on the Mississippi river, at the city of Alton, and at the other at Terre Haute, Indiana, and traversing a country which is not surpassed in the whole State for the fertility of its soil and salubrity of climate, must be regarded as an improvement of great productiveness. At Terre Haute, it connects with the great canal system of Indiana, extending directly from that town to lake Erie, by the Wabash and Erie canal, and by the Cross-cut canal from Terre Haute to the great Central canal of Indiana. After reaching the Central canal, a direct communication is had with Louisville, by the Mount Carmel and New Albany railroad, with Evansville, on the Ohio river, and with lake Erie, by the Central canal. With these facilities of finding a variety of markets after reaching Terre Haute, the produce of Illinois cannot fail to be thrown upon this important road; and the introduction of merchandize from Louisville and the lakes, by the same route, will form another important item of transportation to swell the revenue of this work.

It is also worthy of remark that all of these roads in the southern district, as well as the other roads in the system, intersect the great Central railroad leading to the mouth of the Ohio. It occurs to me that a little reflection will show that, in consequence of this direct and uninterrupted line of communication with the mouth of the Ohio, and thence with the southern market, the revenue to be derived from *all* the roads in the State must be greatly augmented; for as the produce from every quarter of Illinois can, by these means of inland communication, be sent to the southern market, when the exports of Indiana, Ohio, Kentucky, and Missouri are locked up with the frosts of winter or the droughts of sum-

mer, (and consequently at a time when there is the least competition in market,) a large portion of our exports, which would otherwise float upon our rivers, will be thrown upon the line of the public works. Hence it will almost universally happen that the interests of the citizens will be best promoted by promoting the interests of the State, in giving their business of transportation to her public works. This reciprocity of interests between the State and her citizens, whilst it tends to augment the business on the works, will enable the State to keep the tolls within reasonable and popular limits, as they will always bear reduction in proportion to the amount of business the roads perform. Regarding our system of railroads in this point of view, and considering them as forming great and important mail routes, and inducing, by their greater expedition and safety, an incalculable amount of travel as well as transportation, I cannot but believe that they will, in point of fiscal importance, disappoint their most sanguine friends.

All are free to admit the great importance of improving the channels of our rivers, and I have ever regretted that there were not more of these important lines of communication embraced in our system of internal improvements. The cheapness with which the products of the interior can be transported to market on these natural channels of commerce, form a great saving to the producers who live contiguous to them. All the rivers and their tributaries which penetrate the interior of the southern section of the State abound with timber, of the finest quality, for the construction of boats suitable for the descending trade. These boats are usually built by the farmer with the force employed on his farm, and being loaded and ready for the voyage, are sent off by the first rise of waters in the spring, that he may return in time to put in his crop. In every point of view, casualties and delays are vastly detrimental; and having necessarily to submit to the disadvantage of going to a glutted market, it seems but an act of justice for the State to remove, as far as practicable, all obstacles to the safety and expedition of the voyage.

There are many of the rivers, which the public good requires should be improved, from which no revenue can ever be expected. But the system of *river improvements* should, in a fiscal point of view, be regarded collectively. If the rivers in the southern section of the State should be taken together, the profits of the water-power, on a few of them, would be amply sufficient to remove the obstructions in all the residue. Thus, the water-power at the rapids of the Great Wabash river, which is equivalent to at least 300 run of 4½ feet buhrs, would, at the rates at which these privileges are rented in Indiana, produce an annual income to the States, of \$45,000, in addition to the tolls received for the transit of the immense trade of that river. In addition to this river, the improvements on the Little Wabash will afford a large and profitable amount of water-power, and the Kaskaskia and Big Muddy rivers would assist in swelling this source of revenue. Besides the direct revenue to be derived from the water rents and tolls themselves, these works would indirectly tend to augment the business of the railways leading to and from the points where these water-powers are created.

This hasty glance at the river improvements is sufficient to show that, taking all the rivers together in the southern district of the State, the

whole could be improved, and collectively made to produce a handsome profit to the State. So, I presume it will be found in other sections of the State—as the Rock river, the Kankakee, the Vermilions, the Fox river, and various others, would, if properly improved, produce a surplus of revenue that would be sufficient to improve all the rivers in their respective districts of country, from which no profits in rents or tolls could be derived.

As it is the peculiar province of an engineer to confine himself to the practicability of public works, and leave their expediency to others, I will digress no further.

On retiring from my connection with the public works, permit me to tender through you, to the Board, my sincere acknowledgments for their confidence and kind indulgence extended to me during the time I have had the honor to be in their employment, and allow me, on this occasion, to express my best wishes for the ultimate success of our system of internal improvements—a system of State policy which, I have ever firmly belived, is calculated, with judicious management, to place Illinois, in a very few years, on a footing with the most favored State of this Union, in point of population, intelligence, enterprise, and substantial wealth.

With sentiments of high respect, I have the honor to be, sir,

Your most obedient servant,

EDWARD SMITH,

Principal Engineer of the Southern Engineering District.

INTERNAL IMPROVEMENT OFFICE,

Belleville, October 22, 1838.

DEAR SIR: I have the honor to lay before you the report of Mr. Frederick Hawn, senior assistant engineer on the Alton and Shelbyville railroad, in relation to the preliminary examinations and definite locations of the western division of that line of work.

As stated to you in a former communication, I concur with him in opinion, that the northern, or prairie route, for this road, is the most judicious for the interest of the State, and for the effective usefulness of the work when in operation; and have no hesitation in again recommending its adoption.

I take great pleasure in stating that I believe Mr. Hawn's report fully entitled to your confidence; and that his exertions to discharge the responsible duties assigned to him, entitle him to the thanks of the whole community, and especially of the officers under whose directions his services were rendered.

Very respectfully,

Your most obedient servant

EDWARD SMITH,

Principal Engineer.

HON. WILLIAM KINNEY,

*President of the Board of Public Works of the State of Illinois,
and Acting Commissioner of Second Judicial Circuit.*

Report of Mr. Frederick Hawk, Senior Assistant Engineer.

INTERNAL IMPROVEMENT OFFICE,
Belleville, October 20, 1838.

To EDWARD SMITH, Esq.

Principal Engineer of the Southern Engineering District.

SIR: Conformably to the instructions of Col. McConnel, Commissioner of the Board of Public Works of the State of Illinois for the first judicial circuit, I proceeded with my corps of engineers to the city of Alton, to take charge of a survey of the Alton and Shelbyville railroad. I arrived at my place of destination about the 15th day of April, and reported myself to Gov. Kinney, President of the Board of Public Works and acting Commissioner for the second judicial circuit, to whose charge a part of this work is confided. This work being at that time under the direction of the chief engineer of the western district, he gave me no specific instructions in regard to the mode of operation, except the established precedents of the district, and the law established to maintain a system of internal improvements. On the 8th day of June I received notice from the Secretary of the Board of Public Works, that this work was transferred to the southern district, and that I should report to the chief engineer thereof; and in pursuance with the above notice, I now offer the following detailed report.

By reference to a map of the country included in the general route from Upper Alton to Hillsboro, two definite routes present themselves, to wit: one on a direct line, crossing the east and west branches of Wood river, which may properly be termed the southern route, and one heading those streams and their tributaries—(except Coal branch)—the northern route. They encounter much broken ground for several miles in the advance Upper Alton, particularly that portion of country in the immediate vicinity of Coal branch. This stream rises about three miles west of Upper Alton, and flows in a southeastern direction, and forms a confluence with the west branch of Wood river, one mile north of Upper Alton. It has many tributary branches, which have indented the surface into numerous and formidable ravines, extending in various directions. Many of these have their sources within a few hundred feet of each other, running in nearly opposite and sinuous directions, so much so that it is impossible to approach the main branch without encountering some of those obstacles.

From these facts, I deemed it impossible to come to any accurate conclusions in reference to the most feasible part of the country in the vicinity of this branch by reconnoissance; inasmuch as the feasibility of a line would frequently be affected by running a few hundred feet to the right or left. In order to facilitate operations, by superseding the necessity of projecting many random lines, and gain a thorough knowledge of the situation of the obstacles to be encountered, I thought it expedient first to make a topographical survey and map of the country bordering upon this stream to the west branch of Wood river, including the probable crossing of that stream. This work having been sufficiently extended, I commenced an examination of the

SOUTHERN ROUTE, BEGINNING AT UPPER ALTON.

The most populous part of the town is situated on a ridge commencing in the bluffs of the Mississippi and extending about one and one-fourth of a mile in a northern direction; thence curving gradually towards the west for one mile and a half, where it unites again with the bluffs of the Mississippi and the table lands. In its northern course it is skirted by the ravine of Shields' branch on the west, and the valley of Wood river on the east and southeast; in its western course, by the tributaries of Shields' branch, Piasa, and the Mississippi on the south, and by Coal branch and its auxiliaries on the north. This ridge is elevated from 116 to 184 feet above the Alton and Mount Carmel railroad, immediately east of Shields' branch, and from 100 to 168 feet above the bottom of the valley of the west branch of Wood river.

The portions of country having different localities are described by different base and diverging lines. The examinations made between Upper Alton and Wood river are represented by four lines, viz: base line No. 1. and diverging lines, Nos. 1, 2, and 3.

BASE LINE No. 1.—This line commences nearly opposite Mr. Debow's dwelling, at station 70, on a line run by the chief engineer of the western district, in a survey made by him in August of last season. From this point the line was extended in a direction to and entering Main street on the old public square; thence passing through the most populous part of this street, it enters valley (A); thence running down this valley to its confluence with Wood river—making a distance of nearly three miles. The first obstacle I encountered, worthy of note, is the undulating surface of the street, which would require alternate cutting and filling, the slopes of which would extend, in many instances, far beyond the limits of the street. In entering the valley, a cut of 28 feet would occur, which would extend back to near Seminary street. The valley through which the remainder of the line passes is badly situated for the economical construction of the proposed work. Its direction is nearly at right angles with Main street, and the curving to overcome the consequent angles would be confined to a short distance, making the radius of curvature about 750 feet; which is the more objectionable, in consequence of its occurring on a plane having an inclination of 71 feet per mile, which is necessary to overcome the depression of the valley of the river. Being aware that the graduation of this line would wholly destroy the usefulness of Main street for ordinary purposes, and the many other objectionable features connected with it, induced me to consider this line wholly inexpedient.

Line No. 1.—This line commences at the same point with the base line, where I made an offset of fifty feet to the right, and thence projected it in a due course to the west branch of Wood river, touching that stream at a point about 500 feet above the Woodburn and Hillsboro roads. This line passes over the southeastern extremity of the town plat of Upper Alton; crosses the Hillsboro road near the bluff of Wood river; and crosses the base line at station 150, in valley (A.) The examinations made by this line were not very satisfactory, it being impracticable to reduce it to a grade less than 70 feet per mile, and even this gradu-

ation would be attended with an unwarrantable expense; which induced me to run—

Line No. 2.—This line commences on the bank of the west branch of Wood river, 350 feet west of the termination of line No. 1; crosses the point of a ridge formed by the valley of the west branch of Wood river, and valley (A); thence crossing this valley by ascending the bluff through a small ravine or depression; thence crossing line No. 1 at station 56; thence continuing the tangent to about 1000 feet southwest of the Milton road, where I commenced a cycloid on a radius of 1400 feet, and continued it 1500 feet, terminating on a ridge formed by the ravines descending into the valleys of Wood river and the Mississippi; thence a tangent intersecting at station 4 of the base line. The length of this line is one mile and three-fourths, and is decidedly preferable to line No. 1, in consequence of the advantages furnished by a small ravine in the bluffs of the river, which would reduce the cutting materially; and as this line avoids coming in contact with the summit ridge so soon by its running further south; and as it crosses some extensive ravines, which also would aid in reducing the excavation necessary to bring the line to the most eligible grade.

Not being wholly satisfied with the examinations already made, I therefore proceeded to the examination of another route, the result of which was ascertained by

Line No. 3.—I commenced this line at station 18 of line No. 2, and projected it in a due course to the public square in Upper Alton, and intersected the base line near the post office. The length of this line is one mile, and would require a grade of 73 feet per mile, with expensive grading, of which the cuts would predominate, and the greatest portion of which would occur in gaining the summit in Upper Alton. These obstacles, together with the abrupt curvature necessary to overcome the consecretary angle—the buildings which must consequently be removed, to the serious disadvantage of the owners, without affording them any adequate benefits—and the reason (equally applicable to all the foregoing lines) that they pass through the town with a steep grade, either from 3 to 15 feet below, or 5 to 58 feet above the surface of the streets, render this line very objectionable.

RECAPITULATION.—Having thus carefully made an instrumental examination of all the ostensible routes between Upper Alton and the west branch of Wood river, and given a detailed description of all the lines projected during the examinations, you will be enabled at once, with the aid of the profiles and topographical map, to discover that line No. 2 is the most eligible. To the facts already adduced, I will add some by way of illustration. The valley of Wood river is situated about 100 feet below the most populous part of Upper Alton; and to overcome this depression with a grade of 40 feet per mile, would require a distance of two and a half miles. By referring to the map and profiles, you will perceive that the distance on all the lines, including the descent into the valley, fall short by more than one half; and to remedy this defect, it will then be necessary to make a deep excavation at the commencement, and high embankment at the termination of the slope of the side of the valley. The line which has the greatest facilities for this is the most feasible.

These advantages are gained in part by adopting line No. 2; inasmuch as the elevation of the summit ridge is considerably less, and is comparatively narrowed by the proximity of the ravines of the valley of the Mississippi to those of the valley of Wood river. But it would not be advisable to adopt a grade less than 52 feet per mile, and it would be wholly impracticable to reduce the line to a grade of 40 feet per mile. With these remarks I leave this part of the subject, by stating that line No. 2 was adopted for an estimate of this portion of the route.

After concluding these examinations, I next turned my attention to that portion of country immediately east of the west branch of Wood river. From a reconnoissance, I ascertained that there was no probability of finding any thing like a feasible route on a direct line to Hillsboro in consequence of the numerous ravines and ridges of the east and west branches of Wood river and their auxiliaries; all of which form obstacles too formidable to be overcome with a reasonable expenditure, it not wholly impracticable.

In proceeding with the instrumental examinations, the first material obstacles presented are the bluffs on the east side of the west branch of Wood river. I examined five routes to the table lands—three on the north and two on the south of the Carlinville road, to wit:

BASE LINE No. 2.—This line commences at the termination of base line No. 1, and runs in the direction of the Carlinville road across the river bottom to the bluff; thence up ravine (B.) situated between the Carlinville and Hillsboro roads; thence on the dividing ridge between the east and west branches of Wood river, in the vicinity of the Carlinville road, passing Mr. Gray's plantation, Indigo prairie, and terminating in the edge of Smooth prairie, a distance of 5.03 miles. The first object to be considered on this line is the crossing of the west branch of Wood river. The width of stream varies from 50 to 75 feet from bank to bank, and I have taken great care to ascertain the quantity of water discharged through its channel, and am under great obligations to Mr. David Miller (who has been familiar with its different stages for a number of years) for much valuable information. I have estimated the requisite span for a bridge at 100 feet which will be ample to discharge the water in its highest stages. The foundation for the abutments will be precarious. Superficial appearances indicate a diluvial sand. I had no instruments suitable for making examinations very far below the surface; but, judging from the geological formation of the vicinity, little else can be expected than is indicated by the surface. The bed of the stream is twenty-two and a half feet below the grade line, requiring abutments of nearly that height, exclusive of the depth necessary to excavate for a foundation. Abutments of this height and space will require a thickness of 10.5 feet at the bottom, and 3.75 at the top, with requisite offsets and slope. Stone of an exquisite quality may be obtained within 2.75 miles. In the estimate of cost of the superstructure of this bridge, I adopted Col. Long's latest improved plan. An abundance of good timber is growing in the immediate vicinity; and sawed timber, of such quality as the country affords, (of which I conceive black walnut to be the most preferable,) can be obtained at the city of Alton—a distance of four miles. In crossing the river bottom, nothing extraordinary occurs. It is 1500 feet in width, and lies wholly on the east side of the stream;

but a small portion of it is ever inundated, and it is heavily timbered with white oak, sycamore, elm, black walnut, &c. Upon leaving the river bottom, ravine (B) presents itself. This ravine is 1,360 feet in length, and rises forty-eight feet, which will consequently require a cut of nineteen feet at the head, and a corresponding fill at the termination, to reduce the line to a grade of 55 feet per mile, which is the most eligible. The excavation will not be very lengthy, in consequence of a favorable feature in the surface, in the advance; but the embankment will extend along the river bottom, and most of the material for forming it must necessarily be brought from the excavation and the bluffs, which will render it expensive. The ridge over which the remainder of this line passes, divides the waters of the east and west branches of Wood river. It is from a few hundred feet to half mile in width, and is elevated from 48 to 122 feet above the valley of Wood river at the point of crossing. Its inclination varies from 16 to 39 feet per mile, and the general direction is straight, deflecting about twenty degrees from a tangent to Hillsboro. The line necessarily crosses the heads of some ravines, but they are generally narrow, and most of them not very deep. The most of the ridge is heavily timbered with white oak and black oak, &c., and the soil is well adapted to the construction of a railroad. I may here add that, after the examinations of the country included in the base line were completed, it was also found to be the most feasible, and was taken to be the basis of the estimate for this portion of the route.

Proceeding with the examination, I next ran—

Line No. 1, commencing at station 197 of the base line. I ran down ravine (C) and terminated on the river bottom, one-fourth mile west of the termination of ravine (B.) The ravine through which this line passes is situated on the west side of the Carlinville road, and forms an angle of 35 degrees with the base line, and is 1,600 feet in length. It heads within 200 feet of ravine (B;) is sinuous in its course, and consequently not so well adapted to the location of a railroad as ravine (B.)

Line No. 2.—This line commences at the termination of line No. 1, and continues around the point of the bluff upon which J. Moore's dwelling is situated; thence entering ravine (D;) thence continued up this ravine to its head, terminating at station 219 of the base line, one-fourth of a mile north of Dr. Haskill's cabin. The objections to line No. 1 apply in a greater extent to this line.

Line No. 3.—This line commences at station 52 of line No. 2, and runs along the foot of the bluff to ravine (E) of Long branch; thence up this branch to its head, near Mr. Lec's dwelling; thence in an eastern direction to the Carlinville road, terminating at station 344 of the base line—a distance of $4\frac{1}{4}$ miles from the point of crossing Wood river. This ravine is nearly one and a half miles in length, and is situated nearly parallel with, and about three-fourths of a mile west of the Carlinville road. The ascent is very uniform for one mile. It then increases, and becomes very abrupt before it reaches the table lands; which remark is also applicable to most of the ravines bordering on the Mississippi and Wood rivers. Its general direction is tolerably straight, requiring no very abrupt curves. Its mouth is situated about one mile from the point of crossing the west branch of Wood river; but the projection of bluff intervening, or projecting west of the two points, would require reversed

curvatures of short radii, in order to avoid recrossing the west branch. Notwithstanding the greater length of this ravine, it does not afford a more eligible grade to the table lands than that of the base line. It will be seen that this ravine is situated nearly parallel with, and forms a part of the dividing ridge over which the base line passes; which ridge rises from 16 to 39 feet per mile; and, at the junction of line No. 3 with the base line, attains an elevation of 122 feet above the river bottom, at the point of crossing the stream, and 116 feet above the mouth of the ravine; which cannot be overcome with a grade less than 69 feet per mile. The cost of graduation would also be more expensive than the base line, the greater portion of which would be incurred in the extensive cuts and fill at and near the head of the ravine.

Line No. 4 commences at station [2 i] of topographical line [a]; from thence it runs up ravine [F,] and terminates at station 204 of the base line. The main trunk of this ravine is situated south of the Hillsboro road, and heads between that and the road leading from Alton to Carlinville. It is three-fourths of a mile in length, and ascends 75 feet; the most of which is acquired in the last fourth of a mile, which renders it impracticable to apply an economical grade. The general course is badly adapted to the lateral position of the line. It would require an extensive reversed curve from the point of crossing the west branch (which is arbitrary) to arrive at the mouth of the ravine; and in this course the river is necessarily crossed twice; which would lead to the necessity of constructing two extra bridges, or to turn the stream from its present channel. These objectionable features render this line also inferior to the base line.

By a critical examination of all the probable routes by which a transit from the valley of Wood river to the table lands could be effected, the result was not very favorable; but in point of economy and practical utility, I assumed the base line as decidedly the most favorable for making estimates. In continuing the examination in the advance, I next extended

BASE LINE No 3.—This line includes the crossing of the east branch of Wood river, and commences with a cycloid, on a radius of 1,900 feet, at the termination of base line No. 2, and runs diagonally across the south-east portion of a plantation, and enters ravine [G:] thence down this ravine to the junction with the valley of the east branch of Wood river; thence across the river bottom to the stream crossing it, one-fourth of a mile below the union of two branches of nearly equal size, and about two miles below the bridge of the Alton and Carlinville road, over the western branch; thence crossing a point of a projecting ridge, and entering ravine [H,] situated nearly parallel with the eastern branch of the stream; thence up this ravine to its source near Mr. Pruet's dwelling; thence through the edge of barrens to Esquire Tindall's, in the edge of Dorsey's prairie—a distance of 4.25 miles. This prairie is formed by the timber on Paddock's and Indian creeks, on the east and southeast; and by the timber on Wood river and its tributaries on the southwest and west; and unites with the Macoupin prairie on the north. That part of it lying north of the base line is wholly drained by Indian creek and its branches. They extend in various directions; and many of them have their sources within a few hundred feet of the valleys of Paddock's creek and the

auxiliaries of the east branch of Wood river. So much of the general route as is included in this line is far better than could have been expected, when the general features and topography of this portion of the country is considered; and the result of the examinations demonstrates that it is the only point where a crossing of the east branch of Wood river can be effected with a grade less than 85 feet per mile, without incurring an unwarrantable expense. The descent into the valley of the east branch of Wood river, on the west side, is moderately uniform; but in consequence of the serpentine course of the ravine through which the line passes, several points of bluff must necessarily be cut, thereby swelling the expense of graduation to no very inconsiderable sum. There will be two reversed curves with radii of from 100 to 2,500 feet, which will be objectionable in consequence of their occurrence on a plane having an inclination of 56.49 feet per mile, and 1.30 miles in length from the foot of the bluff to the stream [which washes the opposite bluff;] the river bottom is 600 feet wide, and is inundated in times of freshets. The stream is favorably situated for the construction of a bridge. The bank or bluff on the east side is 20 feet high and firm, with a rock foundation. On the west side the bank is low and of an alluvial sand; but I doubt not but a rock foundation can be obtained by excavating a few feet below the bottom of the stream. The abutments on the west side will be about 17 feet in height, and that on the east side 14 feet high. I have estimated the span for a bridge at 80 feet, and in the estimated cost of superstructure, I adopted a plan detailed by Samuel Brooke, jr., assistant engineer in my corps. There are indications of stone within two miles; but their geological character is such that would not warrant an adoption in the estimated cost of masonry. I have therefore founded my estimate on the probable necessity of procuring them near the city of Alton, a distance of 11 miles. Good timber is growing within one mile; and sawed timber at present can only be had by hawling it 10 miles. In crossing the point of a ridge a cutting of 8 feet will occur, which can be favorably disposed of in the construction of the bank required across the valley. The ravine on the east side of the east branch, through which a transit to the table lands is effected, varies but little from that on the west side. The plane adopted is 1.40 miles in length, and ascends at a rate of 55 feet per mile. Nearly the same proportion of curvature will be required but on greater radii; all of which will exceed 1,500 feet. From the termination of the ascent to Esquire Tindall's, the line crosses several extensive ravines, but it can be so modified as to render them of little consequence.

Having thus been carried nearly three miles north of a due line of the proposed route in search of a practicable one—but having examined instrumentally every ostensible practicable feature in the country, I hesitate not to say that a more favorable one cannot be found on a more direct line. After coming to this conclusion, my first object was to ascertain if the residue of the route could not be found on a more direct line: I accordingly ascertained the bearing of a due line to Hillsboro, and extended with that course—

BASE LINE No. 4.—It commences at the termination of base line No. 3, and curves with a radius of 2,000 feet, until the requisite course

was obtained; thence continuing that course to the east side of the west branch of Cahokia creek—a distance of 8.64 miles. This line, in its extension, crosses Indian creek, Paddock's creek (one mile below head of its timber,) three branches of Sweet's creek, and the west branch of Cahokia, all of which, except Indian creek, are tributaries of Cahokia. Most of these streams have extensive valleys, skirted by counter ravines, of auxiliary branches, requiring extensive cuts and fills, and mechanical structures; so much so that it would swell the expense of graduation to an unwarrantable sum. Although this line is direct and practicable, as far as my examinations extended; yet I considered it my duty to examine still farther north for a more eligible route. I became more impressed with the necessity of this course, from a subsequent reconnoissance of the surrounding country. I found that the obstacles passed, formidable as they were, would be very inconsiderable when compared with those yet to be encountered in the crossing of numerous other streams, if the line should be extended. I likewise ascertained that the large prairie on the north, situated between the timber bordering on the Mississippi and the Macoupin creek, to the head of the main or east branch of Cahokia, was remarkably smooth, and admirably adapted to the economical construction and durability of the proposed work. The general surface is an extensive plane, descending south and west, with a dry soil, slightly undulating, affording great facilities for properly draining a road; and, by adopting it, most of the streams would be headed, or rendered but of little consequence. But to make these ostensible advantages available, it becomes necessary to diverge several miles north of an extension of the base line, [No. 4] and arrive at the extreme northing, at the head of the timber on the east branch of Cahokia, within 12 miles of Hillsboro, making the total amount of northing from a direct line, about 9 miles. It was desirable to avoid so great a digression from a direct line, if it could reasonably be accomplished. I accordingly availed myself of a part of the advantages presented by this prairie, in heading some of the streams, and then pass off in a direct line to Hillsboro, after making about three miles northing. In these examinations I extended three lines, viz: line No. 1, the middle line; line No. 2, the northern, and modification of line No. 1; and line No. 3, the southern, or most direct route.

Line No. 1 commences at station 8 of base line No. 4, and terminates on the east side of the west branch of Cahokia, a distance of 8.06 miles: It passes, in a northeastern direction, through Dorsey's prairie, touching the farm of Mr. Jones; thence crossing the line between Madison and Macoupin counties; thence through the plantation of Mr. Town; thence crossing Indian creek; thence passing 400 feet west of Mr. Lovell's dwelling; terminating the tangent west of Bunker's hill, where a curve commences, with a radius of 2,000 feet, and continues until a tangent was obtained that would touch the head timber of the west branch of Cahokia, and extended to that point, crossing Paddock's creek at a favorable point, one half mile above the head of the timber. By referring to the topographical map, you will perceive that this line is much preferable in point of profile to the one having a direct course; and the quantity of northing made from the direct line is nearly three miles, the most of

which is obtained in passing through Dorsey's prairie, which I attempted to avoid in a subsequent examination, hereafter detailed under the head of line No. 3.

Line No. 2 commences at station of line No. 1, and continues the curve of that line until the course of a tangent was obtained that would more effectually head some of the branches of Indian creek and pass over better ground, connecting with line No. 1, directly west of Bunker's hill. This line is situated on the north line No. 1, and diverges about one-fourth of a mile from it. It was taken in connection with line No. 1, from the point of intersecting for estimating the cost of so much of the general route lying between Esquire Tindall's and the west branch of Cahokia.

Line No. 3 was extended, with a view of obtaining a more direct route, by passing on the south side of Bunker's hill, and more gradually acquiring the northing, which must necessarily be made, to avoid the obstacles mentioned in a detail of base line No. 4.

I ascertained by these examinations, that the distance would be somewhat shortened, but at the expense of a greater proportion of curvature, which induced me to give a preference to the line mentioned in a detail of line No. 2.

Having thus rendered the advantages available heretofore referred to, by heading most of the streams encountered in the extension of base line No. 4, I made an unsuccessful attempt to pass in a direct line to Hillsboro; which is detailed in

BASE LINE No. 5.—This line commences at the termination of diverging line No. 4, of base line No. 4, and terminates on the east side of the east branch of Cahokia creek. In its extension, Bear creek, Brush creek, and several other branches, together with the main stream of Cahokia, were crossed; many of which have extensive vales, with counter ravines, and other depressions, forming formidable obstacles to overcome in the construction of the proposed work, and would swell the expense to an unwarrantable sum. During these examinations I ascertained that a better route could be obtained by extending the tangent (line No. 1 of base line No. 4) between Bunker's hill and the head of the west branch of Cahokia. I accordingly extended it with

Line No. 1, commencing at the same point with the base line (No. 5) and terminating on the east side of the east branch of the Cahokia, on the meridian with, and $1\frac{1}{2}$ miles north of, the base line; yet the obstacles encountered fully justified an examination still further north, which resulted in the adoption of the prairie route entire, as heretofore described, and the result detailed in

Line No. 2, commencing within $1\frac{1}{2}$ miles of Bunker's hill, at station of line No. 1, base line No. 4, and terminates on the east side of the east branch of Cahokia, near the head of its timber, on the meridian of the base line, and $1\frac{1}{2}$ miles north of line No. 1. It passes through the centre of Macoupin prairie, about $10\frac{1}{2}$ miles south of Carlinville, the seat of justice of Macoupin county. It heads all the streams, except the east branch of Cahokia, and the indentations of it are so contracted at the point of crossing that it is of but little consequence. The only objection that can be urged against this line is the quantity of northing it makes; but from the thorough examinations made, both instrumentally and otherwise, I can safely say that no route can be found, combining so many advan-

tages, further south, after entering Dorsey's prairie, than the one detailed under the head of line No. 1, in connection with line No. 2, of base line No. 4, and line No. 2, of base line No. 5. This point of crossing the east branch of Cahokia is imperative.

Having thus pushed the investigations to a point within twelve miles of Hillsboro, and on a line due west from that town—and having been carried so far north, with the knowledge, too, that no feasible route could be obtained further south, it occurred to me that a route might be discovered which would avoid the sources of Wood river, and, consequently, the heavy work in crossing the two branches of that stream, together with the steep grades required in approaching and leaving the same. The sources of Wood river being also considerably south of this point, it was evident that a line to Upper Alton, avoiding the waters of Wood river entirely, would not greatly increase the distance beyond the line already run. I therefore proceeded to make an instrumental examination in this direction, the result of which is detailed under the head of

NORTHERN ROUTE.

I commenced the examination of this route at station No. 272 of diverging line No. 2, base line No. 5, and projected it in a course south of west, for 5.23 miles. I then ascertained that if the line was extended it would cross the numerous tributaries of the main branches of Wood river and their indentations, which it was necessary to avoid. I therefore made an offset of 5,000 feet to the north, and ran a line with a course which, if projected eastwardly, would touch the point crossing the east branch of Cahokia, which is imperative on the southern route—this line was then extended westward for 5.10 miles, when it became necessary, from the excessively broken character of the country, to return $2\frac{1}{2}$ miles to station 380, and make another offset of 4,000 feet to the north, and then run with a similar bearing of the last line, which avoided the heads of all the auxiliaries of Wood river, except three small branches, and brought me near Brighton, crossing one of the branches of Piasa creek. From a reconnoissance, I now ascertained that, from a point heading all the branches of Wood river, a straight line might be obtained to the point heretofore referred to, twelve miles west from Hillsboro, on the southern route, a distance of 23.63 miles. This line would pass through Macoupin prairie, near points of timber on some of the branches of Macoupin creek, and within 8 $\frac{1}{2}$ miles of Carlinville. Upon this line I founded the estimated cost of this portion of the route. Although it was not actually traced, yet the requisite knowledge has been obtained from the lines running parallel to it. From the point near Brighton, I extended the line to Upper Alton, passing down on the west side of the west branch of Wood river, on the dividing ridge between that stream and Piasa creek, cutting the southeast corner of Greene county, passing through Scarritt's prairie, one-fourth of a mile east of the Monticello Female Seminary; thence to Coal branch, crossing it one-fourth of a mile east of the Carrollton road; thence to the ridge, heretofore described, upon which Upper Alton is situated, gaining its summit near the fork of the Upper Alton and Coal branch road; thence on the ridge to Upper Alton, passing through Liberty and Manning streets of that town;

and terminating at the beginning of the southern route heretofore described—a distance of 12 miles. From Brighton to Coal branch the line is remarkably favorable; the surface is slightly undulating, and a dry soil, affording good facilities for draining the road. A part of it is partially timbered with black oak, and the greater portion of Scarritt's prairie is under a high state of cultivation. Coal branch and the broken country in the immediate vicinity are the greatest obstacles encountered on this route. But by the aid of the topographical map, a judicious point for crossing it was readily selected. The valley is 400 feet wide, and will require an embankment of 43 feet at the deepest point. It is situated immediately at the foot of the slope, and forms a part of the ridge upon which Upper Alton is situated; the summit of which is gained by a plane of 3,600 feet in length, with an acclivity of 39.35 per mile, which renders it necessary to cross the valley at so great an elevation. After gaining the top of the ridge, it descends very rapidly towards Upper Alton, which leads to the necessity of adopting a plane of 5,900 feet in length, with a declivity of 52.80 per mile. From this to the point of termination, nothing of consequence occurs, except the crossing of some lots of the town plat previous to entering Liberty street.

Having thus completed the preliminary survey between Upper Alton and the east branch of Cahokia creek, a point common to both the northern and southern routes, I next proceeded, in compliance with instructions of the Commissioner of the second judicial circuit, to definitely locate thirteen miles for contract from the city of Alton.

From my investigations between Upper Alton and Hillsborough, I discovered that the prominent consideration which led the chief engineer of the western district to the adoption of the line recommended by him, would be entirely removed by the adoption of the northern route; and having satisfied myself that the northern route was urged by every consideration, I thought it advisable to procure, if possible, a more economical location between the city of Alton and Upper Alton than the one recommended by the chief engineer of the western district.

I accordingly commenced a survey near the crossing of the Mount Carmel railroad over Shields' branch, in the city of Alton, and curving with a radius of 10.50 feet, until the proper direction was obtained to pass up a ravine marked on the topographical map (2A.) situated south-east of the common road leading from the city of Alton to Upper Alton; thence following the ravine to its head; thence passing with a cycloid on a radius of 1,900 feet diagonally over the block of the town plat of Upper Alton, between Garden and Bloomfield streets; thence entering Main street at the junction with Bloomfield street; thence passing through Main to Edwards street; thence diagonally across the block between Edwards and Mechanic streets; thence entering Liberty street at the corner of Mechanic street, where it intersects the northern route, heretofore described. The length of this line is 1.45 miles; the maximum grade is 105 feet per mile; the cost of graduation \$7,871 60. Although the maximum grade of this is very steep, yet, as it is suggested to use horse-power between the two towns, the objection to so steep a grade is measurably removed. The expense of applying horse-power to this part of the line will be greatly lessened by the erection of the depot at the junction of this road with the Mount Carmel road. It is now a well

established practice to place depots on the exterior of towns, and make use of horse-power for the transportation between the depot and the business part of the town. The generally admitted correctness of this practice renders any argument in its favor superfluous. If, then, this practice should obtain in this State, the location of the depot at the junction of this road with the Mount Carmel road at Shields' branch would be not only judicious, but almost imperative. The same horses, then, required for the business part of the city of Alton, could be used for the same purpose between the Lower and Upper towns.

Another consideration, which urges itself with great force in favor of the adoption of this line between the two towns of Alton, is its trifling cost. The estimated cost of the line recommended by the chief engineer of the western district, with the view of crossing Wood river, is \$48,719. The difference in favor of the line surveyed by myself furnishes a strong argument not only in favor of this line, but of the adoption of the northern route beyond Upper Alton.

These considerations induced me to adopt, for definite location, the line above described, as the best possible route between the city of Alton and Upper Alton. To secure to the citizens of Upper Alton the full benefits of a location through that town—to avoid the heavy expense of crossing Wood river and the steep grade on either side of it—to establish a grade through the whole distance to Hillsboro, which would enable a given power to overcome the intervening obstacles with the greatest despatch and trail the greatest amount of tonnage—to secure to the inhabitants along the line of the road the greatest advantages of locations, and to the whole State the benefits of the most economical construction—I was led to adopt the northern route after leaving Upper Alton.

The maximum grade on the northern route is 52.80 feet per mile. The plane, with this grade, is, in the immediate neighborhood of Upper Alton, descending towards the town, and is 5,900 feet in length. Its descent towards the town—the direction in which the greatest portion of the tonnage would be transported—renders it much less objectionable than it would be elsewhere. At the summit, a double track of 500 feet is provided for, so as to enable an engine to return to the depot at Upper Alton for any additional number of cars it would be enabled to trail over the balance of the road.

The maximum grade of the southern route is 56½ feet per mile; and there are 64 miles of grade ranging from 52 to 56½ feet per mile. On the northern route there is no plane, excepting the one above mentioned in the neighborhood of Upper Alton, exceeding 39.60 feet per mile. The planes on the northern route are short and undulating, while those on the southern route are generally long. The consequence is, that an engine of a given power will trail with more speed a greater amount of tonnage on the northern than on the southern route.

The length of the northern route to the point of intersection of the two routes is 35.63 miles, and of the southern route, 31.38 miles. Although the advantage of distance is in favor of the southern route, yet the advantage in grade of the northern route will more than counterbalance it; for a given power, with the same load, will pass, in less time, over the northern than the southern route. For a more critical comparison

of the capacity of the two routes, I would refer you to the tables herewith submitted, marked A, B, and C.

The aggregate cost of the southern route will be (see table of estimates) \$328,772; of the northern route, \$299,436—showing an advantage in favor of the latter, of \$29,336.

Having, for the above reasons, adopted the northern route from Upper Alton, for the continuation of the location of the 13 miles to be put under contract, I have made the necessary maps, profiles, and estimates, which are herewith submitted, together with those of the route from the city of Alton to Upper Alton.

Having thus completed the location of the 13 miles to be put under contract the 22d inst., I proceeded, conformably to your instructions, to the extension of the preliminary survey towards Shelbyville. The surveys are now progressing in the neighborhood of Hillsboro, and from the examinations already made, it is ascertained that the obstacles in the vicinity of that town are not as formidable as were anticipated. Should the season not prove too inclement, I shall be able to complete the survey by the 15th of November.

In conclusion, I but perform, to those composing my corps, a pleasing duty, in stating that in all my operations I have been very greatly aided by them, collectively and individually. Messrs. Edward Shotwell and A. W. Cutter, junior, assistants, have sustained themselves in a manner equally honorable to the service and satisfactory to me; and to Samuel Brooke, jr., especially, am I indebted for the ability and skill with which he discharged all the important duties assigned him during my temporary absence.

With high respect, your obedient servant,

F. HAWN,

Senior Assistant Engineer.

A.

Table of Gradients of the Southern Route.

This table (as well as that of the Northern route) is not continued to the termination of the route, but ends, after passing over the rough ground, at a point where the surface and grades will be equal on both routes.

No. of plane.	Length of each plane.	Direction.	Inclination per mile.	Total elevation and depression, in feet.		Localities.
				Above the Mt. Carmel rail-road.		
	<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	
1	400	descent	13.20	1.00	106.50	In Upper Alton.
2	8,500	"	52.80	86.00	21.50	Descending into the valley of Wood river.
3	700	level	-	-	21.50	In the valley of Wood river.
4	4,300	ascent	55.22	45.00	66.50	Ascending out of the valley of Wood river.
5	3,300	"	26.18	61.33	82.83	On dividing ridge.
6	5,600	"	16.63	78.93	100.47	On dividing ridge.
7	5,200	"	39.60	117.93	139.47	On dividing ridge.
8	1,600	descent	13.19	89.97	135.50	On dividing ridge.
9	2,400	ascent	22.96	129.37	124.06	On dividing ridge.
10	1,400	level	-	-	124.06	On dividing ridge.
11	1,400	ascent	30.09	137.35	132.04	On dividing ridge.
12	400	"	30.09	140.15	134.32	On dividing ridge.
13	2,100	descent	12.67	95.00	129.28	Descending into the valley of East branch.
14	6,900	"	56.49	168.84	55.45	Descending into the valley of East branch.
15	2,700	level	-	-	55.45	In the valley of East branch.
16	7,400	ascent	54.91	217.11	132.41	Ascending out of the valley of East branch.
17	2,400	"	26.40	229.12	144.41	Ascending out of the valley of East branch.
18	1,400	level	-	-	144.41	Ascending out of the valley of East branch.
19	2,400	ascent	34.32	244.71	160.01	In Dorsey's prairie.
20	3,700	"	31.68	246.93	162.23	
21	8,000	level	-	-	162.23	
22	4,000	descent	9.50	176.04	155.03	
23	4,400	ascent	48.04	286.97	195.07	

B.

Table of Gradients of the Northern Route and Line of Location.

In instituting a comparison between the Northern and Southern routes, commence at Plane No. 1. Planes A, B, &c. belong to the line between the Mt. Carmel railroad and Upper Alton.

No. of plane.	Length of each.	Direction.	Inclination per mile.	Elevation or depression.	Total elevation above the Mt. Carmel railroad.	Localities.
	Feet.		Feet.	Feet.	Feet.	
A	200	level	-	-	-	In the valley of the Mississippi.
B	5,800	ascent	105.60	116.00	116.00	Ascending the Mississippi bluff.
C	400	level	-	-	116.00	In Upper Alton.
D	900	descent	52.80	9.00	107.00	In Upper Alton.
1	2,200	ascent	29.56	128.32	119.32	In Upper Alton, Liberty street.
2	900	level	-	-	119.32	In Upper Alton precincts.
3	800	descent	31.68	4.80	114.52	In Upper Alton precincts.
4	100	level	-	-	114.52	In Upper Alton precincts.
5	1,700	ascent	29.56	137.40	124.04	In Upper Alton precincts.
6	100	"	50.68	138.80	125.00	Between N. Buckmaster's and summit of ridge.
7	5,900	"	52.80	197.80	184.00	Between N. Buckmaster's and summit of ridge.
8	100	"	46.72	198.68	184.88	Between N. Buckmaster's and summit of ridge.
9	1,100	level	-	-	184.88	Between N. Buckmaster's and summit of ridge.
10	3,600	descent	40.12	41.16	157.52	Crossing Coal Branch valley.
11	100	"	8.07	41.31	157.47	Crossing Coal Branch valley.
12	100	level	-	-	157.47	Crossing Coal Branch valley.
13	2,400	ascent	31.68	213.08	171.87	Ascending Coal Branch valley on the east side.
14	1,800	"	36.96	225.68	184.47	
15	400	level	-	-	184.47	
16	1,300	descent	34.84	49.89	175.89	
17	1,000	ascent	15.84	228.68	178.89	
18	800	level	-	-	178.89	Opposite female seminary.
19	1,400	descent	25.08	56.54	172.24	
20	1,500	level	-	-	172.24	
21	100	ascent	26.40	233.68	177.24	
22	1,300	level	-	-	177.24	
23	2,500	ascent	36.96	251.18	194.74	Scarritt's prairie.
24	2,500	"	21.12	261.18	204.74	
25	1,700	level	-	-	204.74	
26	400	ascent	26.40	263.18	206.74	
27	2,700	level	-	-	206.74	
28	4,400	ascent	15.84	276.38	219.94	
29	2,800	"	36.96	295.98	239.54	
30	4,500	level	-	-	239.54	
31	1,800	ascent	26.40	304.98	248.54	
32	600	level	-	-	248.54	
33	3,200	descent	39.60	81.04	224.04	
34	100	"	26.40	81.54	223.54	
35	1,300	level	-	-	223.54	
36	500	ascent	26.40	307.48	226.04	
37	1,400	level	-	-	226.04	
38	1,200	descent	26.40	87.54	219.94	

C.

The following table, exhibiting statements of the capacity of locomotive engines to overcome or ascend different grades, with their loads attached, are adduced from actual experiment made upon the different railroads in the United States.

STATEMENT No. 1 exhibits the weight of train a locomotive engine is capable of moving (exclusive of engine and tender) at a rate of speed of five miles per hour, as its ordinary performance, or a maximum of useful effect, upon a railroad in ordinary repair, upon the different acclivities, set in the opposite column, under head of ascent per mile.

By reducing the weight of train, its speed will be accelerated; and an engine that will overcome an ascent of twenty-five feet per mile, with a train weighing 60.24 tons, at a rate of speed of five miles per hour, will, under the same circumstance, attain a speed of ten miles per hour, with a train weighing 37.36 tons.

STATEMENT No. 2 exhibits also the weight of train (exclusive of engine and tender) as the extraordinary, or greatest effect upon the same grades, and at the same rate of speed, under most favorable circumstances, where the cars, road, and machinery, are in perfect adjustment, and the engine supplied with the best fuel, &c.

STATEMENT No. 3 exhibits the weight of load a horse can draw at a speed of two and a half miles per hour, and for eight hours per day, upon the several grades opposite in the column of grades.

By applying this table to ascertain the capacity of a road, it should be remembered that, although the calculations are not made with reference to grades of a particular length, a locomotive can, for a short period, double its usual performance; and if the planes are short and alternate, with levels or descents, a much greater useful effect can be produced on them. For example: a locomotive can ascend an acclivity of ten feet per mile, trailing a train weighing 89.65 tons; whereas, if it traverses a level with that load, it can meet with and ascend, for a short distance, an acclivity of twenty feet per mile; but if the grade is of great length, it can ascend it with only 67.86 tons.

Ascent per mile.	No. 1. Maximum of useful effect.	No. 2. Extraordinary or greatest effect.	No. 3.
<i>Feet.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Level	123.88	266.16	16.00
5	106.00	220.40	14.07
10	89.65	184.24	12.05
15	77.40	163.20	10.55
20	67.86	144.13	9.37
25	60.24	128.88	8.44
30	54.00	116.40	7.67
35	48.80	106.00	7.03
40	44.40	97.20	6.49
45	40.62	89.65	6.02
50	37.36	83.12	5.63
55	34.50	77.40	5.27
60	31.97	72.35	4.96
65	29.73	67.86	4.68
70	27.72	63.85	4.44
75	25.92	60.24	4.22
80	24.28	56.97	4.11
85	22.80	54.00	3.83
90	21.44	51.28	3.67
95	20.20	48.80	3.51
100	19.05	46.51	3.37
105	18.00	44.40	3.25

Report of Walter Terrell, Engineer Southern Cross Railroad.

INTERNAL IMPROVEMENT OFFICE,
Belleville, October 23, 1838.

TO EDWARD SMITH, Esq.,

Principal Engineer of the Southern Engineering District of Illinois.

SIR: In compliance with your letter of instructions, received on the 17th of September, ordering an examination, survey, and definite location of two miles of the Southern Cross railroad, at Carlyle, embracing the crossing of the Kaskaskia river, I herewith present you a brief report of estimates, grades, and curvatures thereof.

Field operations were commenced on the 19th day of September and vigorously prosecuted till the 30th, notwithstanding the frequent attacks of sickness on several members of the party.

A compass and level line was first run from the Kaskaskia river, eastwardly, along the great western mail route to the Grand prairie, a distance of three miles, by which the general elevation of the country could be correctly determined. Finding thereby that there were two ridges, to wit, Bond's and Huey's, each of which is eighty-two feet above the general level of the river bottom land, and unfortunately at right angles to the direction of the survey—a strict reconnoissance was then made to pass around or through them in depressions.

Notwithstanding two miles only were directed to be definitely located, yet it was found absolutely necessary for the examinations to extend each way much further, in order thereby to ascertain the obstacles which would be in the continuation of any one of these routes.

A location was then commenced on the west edge of Grand prairie, passing the lowest possible ground on the ridge, about a half mile north of Col. Huey's house; in which ridge was an average cut of twenty-three feet for about twelve hundred feet, with a grade of sixty-two and a half feet per mile for 2800 feet; thence passing Spring creek, though dry, yet having the appearance of discharging a great quantity of water during freshets. This valley, about four hundred feet wide, must be passed with an embankment of thirty-four feet high, and consequently, a very costly culvert, not less than six feet chord and one hundred feet long—suitable stone being about five and a half miles distant and on the opposite side of the river.

The line then passes over a post-oak flat, and nearly horizontal, for a half mile; then descending into the low land of the Kaskaskia bottom, with a grade of fifty-five and a half feet per mile, for nearly a half mile, crossing a creek requiring a small tressle bridge and several small drains; thence around the north end of Bond's ridge, with grades nearly horizontal, and curves not exceeding four degrees. This is mostly side-hill cutting, and very precipitous, the base of the hill having been once washed by the river, and is yet overflowed to the depth of eight or ten feet at high water, as indicated by drift-wood and ice marks. After leaving this bluff, which is indented with frequent and deep ravines, the line passes a fourth of a mile north of Mrs. Bond's house, and with a five degree curve enters the Kaskaskia bottom, and obtains the north edge of the great western mail route embankment; contiguous and parallel to which it crosses the Kaskaskia river, in the pool of the Carlyle mill-dam; thence

with a sinuous line, deflecting according to the nature of the country, it passes through the lower town of Carlyle; and about one mile west of which, in a direction to the Shoal creek crossing, it terminates.

The next route which invited particular attention and critical examination, was one in which Huey's ridge could be avoided—a deflection from the aforesaid line (marked A,) near the northeast edge of Bond's bluff, bearing south $57\frac{1}{4}^{\circ}$ east, in the direction to cross a depression in Huey's ridge, about half a mile south of the great western mail route, where the experimental survey of July, 1837, crossed it. This line was found to be practicable, having moderate grades and gentle curves; yet, from its passing obliquely through several farms, and making three-fourths of a mile southing, after having made a fourth of a mile northing, rendering it materially objectionable.

An examination of a route crossing the Kaskaskia a quarter of a mile north of the mail route, and deflecting from the north route [marked A] on the east side of the river, crossing the bottom on about the same elevation as the former line; thence, with a tangent, through Judge Breese's addition to Carlyle. This line, like all others, has its advantages and disadvantages. For practicability and cheapness, it equals the route in which the railroad and the mail route cross together, except in the one particular of the bridge, which would be for railroad purposes only—and the embankment being single, and not having the support of being connected with the mail route embankment. This, together with the route marked A, consists principally of clay graduation and heavy timbered grubbing and clearing.

The southern route, marked B on the map and profile, is next considered. This line occupies nearly the same ground whereon was run the experimental line of July, 1837. It commences in the east edge of section 20, township 2 north of range 2 west of the third principal meridian, and thence west over the south end of Bond's bluff, where there is an average cut of twenty-five feet for seven hundred feet, a five degree curve, with a grade of fifty-eight feet per mile for three thousand six hundred feet, descending to the bottom land of the Kaskaskia. From the elevation of this hill, and the depth to which it will be cut, rock may be apprehended. Before the operations for graduation shall have commenced, it may be advisable to sink a test-pit at the greatest depth of cutting, which is thirty-two feet, and if rock should be found, the grade may be conveniently raised, and thereby render it less expensive. This, as the north line, crosses the bottom on the north side, and at the foot of the mail route embankment, and occupies the same ground through the town of Carlyle to its termination. Worthy of consideration, and in connection with this route, may be mentioned the alley route. This line, upon examination, may be found to interfere least with the private property of the town; yet there is a grade of sixty-three and a half feet per mile for nine hundred feet, directly west of the Kaskaskia river crossing.

It appears necessary that a choice should now be made between the north and south routes. It will appear from the maps, that they connect on the river bottom, and thence to the western termination, occupying the same ground. From an investigation of the costs for the two miles only, including the bridging, it will be seen that the south exceeds

the north route by \$4,428, which would be but a small argument in favor of the north; and when it is known that the two miles on the south route embrace all the heavy and expensive graduation, with grades and curvatures but little if any exceeding the north route; and a continuation of this line, either at the east or the west end, would require but little graduation and no grubbing or clearing; (while that of the north would require expensive graduation and heavy clearing and grubbing)—it is reasonable to conclude that a preference should be given to the south route.

The whole work has been divided into three sections—the graduation grubbing, clearing and draining for the two miles, comprise two sections, being one mile each—and so arranged that they may be prosecuted without interfering the one with the other. The bridging and masonry, together with the pits and foundations, comprise the third section.

The same amount of tressle bridging, on the river bottom, has been adopted for the railroad as had been contemplated on the western mail route, and insituted in similar situations, except that stone abutments be used instead of wood.

The estimates for the main bridge across the Kaskaskia have been made upon Burr's plan, with double track roadway and roofed—three ribs and three double arches of 110 feet span; to which are added two land spans, of 30 feet each, of double track, supported on stone piers.

The stone for the abutments, &c., can be obtained about two and a half miles south of Carlyle, near the river bank. The quarries have not been opened to that extent which would warrant a certainty of obtaining first rate rock; but from the natural appearances, a conclusion may be safely drawn that suitable stone for range rock or range rubble masonry can be had.

For a full and more satisfactory explanation of this survey, in addition to this report, I beg leave to refer you to the maps, profiles, and estimates, on which are shown the sub-divisions of the work into sections. All of which is respectfully submitted.

WALTER TERRELL.

An estimate of the probable cost of that part of the Southern Cross Railroad as lies in and near Carlyle, and on each side of the Kaskaskia river, and embracing a distance of two miles.

SECTION No. 1, commencing in the east part of section 20, township 2 north, and range 2 west of the principal meridian, and extending northwestwardly over the Kaskaskia river bluff and nearly to its foot, a distance of 5,300 feet.

4,626 cubic yards of embankment, at 18 cents	-	-	\$832 68
43,026 cubic yards of excavation, at 20 cents	-	-	8,605 20
33 chains of clearing, at \$4	-	-	132 00
28 chains of grubbing, at \$4	-	-	112 00
1 open drain of 3 feet span, 6 perches, at \$4	-	-	24 00

\$9,705 88

SECTION No. 2, extending across the Kaskaskia river bottom adjoining and parallel to the Great Western mail route, and to the west end of Carlyle proper—5,300 feet.

12,657 cubic yards embankment, at 20 cents	-	-	\$2,521	40
14,526 cubic yards excavation, at 20 cents	-	-	2,905	20
13 chains clearing, at \$4	-	-	52	00
5 chains grubbing, at \$4	-	-	20	00
3 stone drains, 92 perches, at \$4	-	-	368	00
			<u>\$5,866</u>	<u>60</u>

SECTION No 3 comprises the main bridge of 150 feet over the Kaskaskia, and connected within two spans of 30 feet each; the masonry, foundation pits, foundation timbers, if necessary, 600 feet lineal of tressle work bridging at two different places on the river bottom, and the masonry of abutments, if adopted,

BURR'S PLAN.

Superstructure.

150 feet lineal of main bridge, at \$40	-	-	\$6,000	00
60 feet lineal land spans, at \$15	-	-	900	00

Masonry of range rock work.

1,150 perches, at \$6	-	-	-	6,900	00
260 perches on small piers, at \$5	-	-	-	1,300	00
260 $\frac{1}{2}$ in. bolts	-	-	-	104	00
Pits and foundation timbers	-	-	-	400	00

Single track tressle work on river bottom.

600 feet lineal, at \$4	-	-	-	2,400	00
4 stone abutments, 130 perch, at \$5	-	-	-	650	00

\$18,654 00

No. of Sections.	Tangents.	Curves.			
		2	3	4	5
1	4.100	-	-	-	1,200
2	2.100	-	-	2,600	600

EXHIBIT No. III.

REPORT OF ELIJAH WILLARD,

WITH ACCOMPANYING DOCUMENTS.

INTERNAL IMPROVEMENT OFFICE,
Vandalia, December 10, 1838.

To the PRESIDENT of the Board of Public Works.

Since the meeting of the Board of Public Works, in June last, 3 miles and 2.16 chains of one hundred feet of the Central railroad, at the northern crossing of Cash river, have been put under contract.

Contract No. 3—in length four chains of one hundred feet, including the building of a bridge at the southern crossing of Cash river, has been relet in consequence of the persons to whom the work was awarded at the letting in Jonesboro, on the 7th day of May last, failing to enter into contract.

These two contracts were awarded to Bryan Shannissee, of Madison county, Ill., at the letting in Jonesboro, on the 23d day of August last, and are contracted to be finished and delivered up to the State on or before the first day of December, 1839.

Much has already been done; and from the known responsibility and efficiency of the contractor, there is no doubt of his having the work completed within the time specified.

Contract 7—in length, 3 miles 3.6 chains of one hundred feet, was awarded to Graham and Ryan; and contracts 1, 2, 4, 5, and 6, in length about 17 miles, to M'Ginley and Graham, at the letting in Jonesboro, on the 7th day of May last, who are bound to have the same completed, and ready to deliver up to the State, on or before November 1, 1839.

The work on these contracts is in a favorable state of forwardness, exhibiting such industry, efficiency, and perseverance on the part of the contractors as to ensure the completion of the same within the time required of them. The work on all of these contracts embraces about twenty-three miles of the Central railroad, extending from the bank of the Ohio river, in Cairo city, northward.

Henry Singleton, of St Louis, has contracted to deliver, on or before the first day of March, 1840, the timber for the superstructure of all of these portions of the railroad, at about \$1,623 per mile. The contract was awarded to him at the letting at Cairo city, on the 7th day of November last. From the known character of Mr Singleton, it is believed that this work could not be in better hands for the interests of the State.

Ten acres of land has been purchased for the depot ground in Cairo,

at the southern termination of the road, in the most favorable situation, and with all the advantages of an excellent landing on the Ohio river; for which was paid five hundred dollars.

An order of the Circuit Court was obtained last spring, at Unity, in Alexander county, for the right of way of the Central railroad through sections 25, 26, 23, 14, 11, 3, and 2, in township No. 17, south range No. 1 west of the 3d principal meridian, and for the privilege of materials for the construction of the road, without an award of damages to the proprietors of the land.

The right of way has been relinquished, voluntarily, through thirteen tracts of land in Union and Alexander counties. No case for the right of way has come to the decision of a jury in either of these counties, and it is presumed that none will.

About one thousand acres of land, in Alexander county, has been purchased for the State, at Government price; about one-half of which was entered within the last six months, all of which is well situated and of much value to the State. A house for a railroad office and lot in Jonesboro has been purchased, for which three thousand dollars was paid. This building and lot are at a very convenient point for the business of the third judicial circuit, and more particularly for the southern portion of the Central railroad.

Two engineering parties were organized and commenced operations on the Central railroad, near its southern termination, about the first of February last—one party running experimental lines, and the other locating. Both parties continued in the field until about the first of May, when one was disbanded, and the other continued in the field until they completed a line from Cairo to Vandalia, which was accomplished about the first of June, when they returned to Alexander county and continued operations in the field until about the first of November; when the party was disbanded, and only a sufficient number of engineers and assistants retained to superintend the works in progress of construction.

That part of the Alton and Shawneetown railroad between Shawneetown and Equality, is divided into ten sections of about one mile each.

The delivery of the timber for the superstructure of the bridge at the crossing of the north fork of the Saline, and for the superstructure of this part of the road—about twelve miles in length—was put under contract at the letting in Shawneetown on the 10th day of September last; which is contracted to be delivered on the line of the railroad on or before the 31st day of December, 1839.

Orvell Sæton, of Gallatin county, Ill., has the contract for furnishing timber for the superstructure on section 1; E. A. and A. A. Gibbon, of the same county, for sections 2, 3, 4, 5, 6, 7, and 8; John Crenshaw, for section 9, and the timber for the bridge; and Benjamin White, for section 10; John Crenshaw and Edgar Bogardus, for the building of the offices and depot buildings at Shawneetown; and for building the depot building at Equality, which they have agreed to have completed within eighteen months from the 12th of September last. All of these men are considered efficient contractors.

Alfred Richerson, who contracted for sections 1, 2, 3, 4, 6, 7, 8, 9 and 10, comprising about eleven miles of this road, at the letting in Shawneetown, on the 15th of March last, has his work in a state of advancement

highly creditable to himself as a contractor. This work is contracted to be completed on or before the 25th of November, 1839.

Section No 5, about one mile in length, taken by James Ryan, at the same time and place, and to be finished at the same period, is in a favorable state of forwardness.

In obtaining the right of way, no difficulty of importance has arisen on the work. Three cases only have gone to a jury; one of which is about to be settled with but little expense to the State. The other two are yet undetermined.

The general disposition of the citizens owning land along the line of the road has been to relinquish voluntarily. The citizens of Shawneetown and Equality have been as liberal as could be desired in their donations of land to the State on which to erect depots, buildings, offices, machine shops, &c. Those of the former place have released to the State about four acres, in lots, very favorably situated for the purposes of the road; and those of the latter, a sufficient quantity for all present and future purposes.

A tract of land of about 800 acres, entered in Gallatin county, at government price, for the State, has become quite valuable, and would readily sell at a very considerable advance on the cost. The entry on the line of the road at Muddy river is valuable.

An engineering party was organized on this road last spring; their operations extended from equality to the intersection with the Alton and Mount Carmel railroad, locating, in the mean time, about thirty miles north of Equality, and three miles at Silver creek, ready for contract. The party was discharged from the field about the first of October last.

The total amount of money received by me	-	-	\$91,371 46½
Amount expended on Little Wabash river since the 4th June last	\$2,724 65½		
Am't expended on same river previous to 4th June last	211 76		
		\$2,936 41½	
Total amount expended on Alton and Mount Carmel railroad previous to 4th June last, (principally for Government land)	-	1,975 29	
Expended on account of general fund previous to 4th June last	1,715 00		
Expended on acc't of general fund since 4th June last	1,485 00		
	3,200 00		
Of this general fund there has been charged to Central railroad	-	2,350 00	
Amount expended previous to 4th June last, on Central railroad	-	14,768 22½	
Am't expended since 4th June last on Central railroad	22,525 37½		
		39,643 60½	
Of the general fund there has been charged to Alton and Shawneetown railroad	850 00		
Amount expended previous to 4th June last on Alton and Shawneetown railroad	13,152 33½		
Amount expended since 4th June last on Alton and Shawneetown railroad	28,761 41½		
		42,763 75	
Total amount expended by me	-	-	87,319 05½
Amount due the State on the 3d December, 1838	-	-	4,052 40½

All the money expended in the purchase of land is charged to the railroad to which they are adjacent.

No lettings have taken place on the Little Wabash river, in consequence of the inadequacy of the appropriation to commence and complete the most important improvements in a manner contemplated by law. A survey of the river has been made—the result will be found in the report of the principal Engineer, Mr. Smith, a copy of which is hereto annexed and made a part of this report. That portion of the timber obstructions, estimated at \$3,658, will soon be removed. This work is carried on by Captain Joseph Jones, of Mount Carmel, who was employed under the direction of the principal engineer.

The report of the principal engineer in charge of the Central railroad, and Shawneetown and Alton railroad within the 3d judicial circuit is in process of preparation, and will in a short time be submitted, to which I shall request a reference for details.

I have the honor to be,

Your obedient servant,

ELIJAH WILLARD, *Commissioner.*

INTERNAL IMPROVEMENT OFFICE,
Mount Carmel, November 10, 1838.

TO ELIJAH WILLARD, Esq.

*Commissioner of Public Works of the State of Illinois
for the third Judicial Circuit.*

SIR: The surveys and examinations of the Little Wabash river having been closed for the season, I have the honor to submit to you, herewith, the drawings, estimates, and field books in relation thereto.

As was stated to you in a former communication, the continuous high stage of water in the river delayed, until near midsummer, the proper examinations requisite to be made of the bed of the stream, to determine on the most judicious plans for improvement. A preliminary survey of the river about the obstructions at Carmi and New-Haven, was made early in the spring, with the expectation that the soundings could be taken and the bed of the river examined shortly thereafter; this expectation was disappointed by the cause above alluded to.

As soon, however, as it was at all practicable to determine the nature of the obstructions at the two points above named, with a view of fixing on a plan of operations, Mr. Seymour, assistant engineer, was detailed to that service.

The result of this survey and examination, with the plans proposed by the engineer for the improvements at New-Haven, together with his estimate of the probable cost of executing them, were submitted to you in the month of August last. The leading object in view in projecting the plans above alluded to, was to endeavor to bring the costs of construction within the limits of the appropriation, and thus secure the immediate prosecution of the work. It was understood at the same time, that the proprietors of the hydraulic privileges at New-Haven valued their vested rights, which it was necessary for the State to obtain before erecting the works, at a sum which, if paid, would reduce the appropriation to a rather limited amount.

The law, also, imperatively requires that the improvements on the river should be adapted to *steamboat* navigation. It consequently became necessary to submit plans of rather a temporary and perishable character, and by no means such as a judicious economy, the best interests of the community, or the importance of the improvement would seem to demand. The plan of a wooden lock, submitted by Mr. Seymour, was regarded as rather an unavoidable expedient under the circumstances of the case, than entitled to your adoption; and it was even found that the residue of the appropriation, after paying the demand for damages, would be insufficient to complete the work, even on that undesirable plan.

These facts having been submitted to you, and the letting being suspended until the interview which we had at the railroad lettings at Shawneetown, on the 10th of September last; and it then having been concluded not to involve the State in contracts and liabilities beyond the means of the appropriation to liquidate, it was thought most advisable to defer the lettings of the work until the meeting of the Legislature. With the hope and expectation that additional appropriations would be obtained

to ensure the construction of the work on a more permanent and substantial plan, I instituted further and more minute examinations of the bed of the river during the low stage of water; and herewith submit the result.

The unusual depression of water in the river was very favorable for these examinations, and they developed the fact that the fall at the New-Haven and Carmi ripples to be overcome by the proposed works was greater than the approximate calculations, made during the higher stages of water, had indicated.

In order to overcome the rapids at New-Haven, and extend slack-water navigation to the town of Carmi, it will require a lock of at least eighteen feet lift. It is proposed to construct this lock within the bed of the stream, as shown by the drawings, and to be submerged at a stage of water that will give at least four feet depth of water over the comb of the dam.

A plan, profile, and estimates of the probable cost of a dam, and a steamboat lock one hundred and thirty-three feet by thirty-five feet within the chamber, and calculated to effect the above object, accompany this report.

The dam is to be built of substantial crib-work, filled with stone, and planked; and the lock of the best sandstone rock found in the vicinity of the work, and to be laid in ranged hammer-dressed masonry, with hydraulic lime, and lined with plank.

It is proposed to use limestone for the breast rock, hollow quoins, and capstan wells, which can be procured from the Ohio river.

A lock of this description would combine economy with durability, and answer the purpose of a cut stone lock of much more expensive construction. The dam would be of sufficient height to produce a valuable amount of water-power, ensuring profit to the State, and incalculable benefit to a fertile and interesting portion of country immediately contiguous to the work.

The plan above suggested is not recommended as the best that could be adopted. If a sufficient appropriation could be obtained to construct a canal and locks around the falls both at Carmi and New-Haven, it would certainly be highly preferable to placing the works within the bed of the stream. The dams at both points, and especially at Carmi, could have much additional elevation, and the effective amount of the water-power vastly increased without prejudice to the country above them; and it admits of easy calculation to show that the interest on the additional costs of the work would bear but an inconsiderable proportion to the increased value of the water-power thereby created.

The result of the examinations and estimates of Captain Joseph Jones, the superintendent on the river, in regard to the timber obstructions to the navigation, have been submitted. Agreeably to your instructions, the superintendent is progressing with the removal of the timber obstructions with as strong a force as he has been able to employ; and as the health of the valley improves, he expects to be able to obtain a sufficient number of first rate hands to ensure its very efficient progress, if not its completion the present fall and winter: All which is respectfully submitted.

EDW. SMITH,

Principal Engineer, &c.

An estimate of the probable costs of constructing a dam and steamboat lock on the Little Wabash river, at New-Haven, accompanying the engineer's report, dated November 10, 1838.

1,583 cubic yards of excavation in lockpit, at \$2	-	\$3,176 00
4,070 cubic yards of excavation in channel below lock, at \$1 50	-	6,105 00
2,000 cubic yards of earth excavation above water, at 20 cents	-	400 00
9,222 feet of lumber in lock foundation, at 15 cents	-	1,383 30
8,400 feet of plank (3 inches), at 6 cents	-	504 00
8,400 feet of plank (2 inches,) at 4½ cents	-	378 00
6,300 feet of lining plank, at 5 cents	-	315 00
1,680 feet of string timber in wall, at 15 cents	-	252 00
Lock-gates, water-sills, and apparatus	-	1,600 00
9,000 lbs of wrought iron, at 15 cents	-	1,350 00
5,000 lbs of cast iron, at 8 cents	-	400 00
2,853 perches of ranged hammer-dressed masonry laid in hydraulic cement, at \$9	-	25,677 00
Limestone hollow quoins, breast and well-rock	-	1,300 00
250 feet of crib protection above and below lock, at \$10	-	2,500 00
		<hr/>
		\$45,340 00
290 feet of dam, (crib-work filled with rock and planked with 5 inch plank,) at \$26 per foot running	-	7,540 00
360 perches of ranged rubble masonry in abutments, at \$6	-	2,160 00
960 yards of slope protection wall, at \$1 50	-	1,440 00
2 culverts for hydraulic purposes	-	2,500 00
Side-cut for use of water-power	-	2,500 00
		<hr/>
		\$61,480 30
Add for superintendent and contingencies	-	3,074 00
		<hr/>
Total amount	-	\$64,554 31

NOTE. The same description of improvement will be required at Carmi; and the above estimate may be considered applicable in amount, or nearly so, to the works at that point also.

An estimate of the probable cost of improving the channel of the Little Wabash river by removing the timber obstructions therein, and forming cut-offs to the long and abrupt bends, which each estimate is predicated on the survey and examinations of the said river from Louisville, in Clay county, to its mouth, by Capt. Joseph Jones, superintendent, under the direction of E. Smith, principal engineer, &c.

NOTE. The work is classified into two classes; the one embracing the clearing of the channel by removing drift, snags, and sunken logs, and by clearing the banks of falling in timber, designated as indispensable work, and the other class, embracing the cut offs, designated dispensable works, viz.

	Dispensable works.	Indispensable works.
<i>Section No. 1, (distance 40 miles,) extending from Louisville, on section 18, township 3 north, range 7 east, to M'Cauley's bridge, on section 21, township 3 north, range 8 east, in Clay county.</i>		
Estimate for clearing leaning trees - - - - -	-	\$628 00
“ “ drift - - - - -	-	102 00
		\$730 00
1st cut-off - - - - -	\$1,405 18	
2d cut-off - - - - -	156 00	
<i>Section No. 2, (distance about 45 miles,) extending from M'Cauley's bridge, on section 21, township 3 north, range 8 east, to Mitchell's farm, on section 20, township 1 north, range 10 east, in Wayne, Clay, and Edwards counties.</i>		
Estimate for clearing - - - - -	-	1,106 00
“ “ drifts - - - - -	-	120 00
		1,226 00
Cut-off nearly washed through above Shelby's mill, estimated - - - - -	-	30 00
<i>Section No. 3, (distance about 42 miles,) extending from Mitchell's, on section 20, township 1 north, range 10 east, to Leach's mill, on section 20, township 2 south, range 9 east.</i>		
Estimate for clearing - - - - -	-	666 00
“ “ drift - - - - -	-	26 00
1st cut-off (½ mile around, 50 feet across, 10 feet high, 50 feet wide at the bottom and 60 feet at the top,) making 925 cubic yards excavation, at 15 cents -	138 90	
2d cut-off nearly formed; boats pass through in high water.		
3d cut-off, (the bend in which Elm river empties, 5 miles round, 1,925 feet across, 10 feet high, 40 and 60 feet wide, slough running across on surface; general course northeast and southwest,) making 35,648 cubic yards excavation, at 15 cents	5,347 20	
4¼ acres clearing, at \$10 - - - - -	42 50	

ESTIMATE—Continued.

	Dispensa- ble works.	Indispensable works.
<i>Section No. 4, (distance of about 62 miles,) from Leach's mill, on section 21, township 2 south, range 9 east, to Carmi, on section 13, township 5 south, range 9 east, in Wayne and White counties.</i>		
Estimate for clearing - - - - -	-	\$652 00
Drift, none.		
Cut-off—course, northeast—nearly formed, about a mile round, and 180 feet across.		
<i>Section No. 5, (distance about 48 miles,) extending from Carmi, on section 13, township 5 south, range 9 east, to mouth of river, on section 24, township 7 south, range 10 east, in White and Gallatin counties.</i>		
Estimate for clearing - - - - -	-	358 00
Drift, none.		
Cut-off—western bank worn to a hollow, and comes up sloping on the eastern bank to the height of 10 feet, 110 feet across; course northwest and southeast.		
Total amount of clearing - - - - -	-	\$3,658 00

CENTRAL RAILROAD OFFICE,

Vandalia, December 24, 1838.

To the Hon. WM. KINNEY and ELIJAH WILLARD,
Commissioners of the Board of Public Works.

GENTLEMEN: I have the honor to submit a report of the past operations and present state of the Central railroad from Vandalia to the city of Cairo.

The first surveys of this line were commenced at Cairo in August, 1837, and steadily prosecuted until the severity of winter compelled a suspension of field work. During the succeeding spring a distance of twenty miles was located, and on the 7th day of May was put under contract; in the mean time, the examination of the country was progressing. In August, a further portion of the work, including three miles at Vandalia and three additional miles in the south, was prepared by order of the Board, and contracted.

The work at the southern end was divided into eight contracts, the length of which was made to depend on the amount and nature of the work embraced in them. The work at Vandalia was divided into two contracts.

The estimated cost and contract cost are hereto appended in tabular form, as also a table of grades and curves and tangents.

A plan and profile of the line and plans of the structures designed will also accompany this.

The law having confined the point of starting to Cairo city, there was but little range in the selection of a site for the depot. Several causes operated in the selection of the present site. Its position is on the Ohio river, about three quarters of a mile above its mouth. The river bank at this point is the highest of any throughout the extent of the city front. Its vicinity to the mouth will diminish materially the inconvenience in touching at the port for vessels engaged in the Mississippi trade; whilst the gentleness of the current, and the unvarying depth of water, at once make it as good a harbor as can be desired.

The Mississippi, on the contrary, from its impetuosity and the variability of its channel, renders the permanance of a good harbor and landing very uncertain. It will, however, be a matter of future consideration whether a depot and landing place should not be constructed on the Mississippi bank, to be used when the stage of water will permit.

The reiteration of statements extremely disadvantageous to the position of the point by law required to be selected for this depot—vague and uncertain to some extent as they are, and originating in antagonistical interests, although discredited by me—has had the effect to cause a very careful examination of the whole point. The result has been a thorough conviction that the State incurs no risk in completing her works. The earth is firm and dry, and fully capable of sustaining the weight of any mass of buildings which could be crowded thereon.

During the highest water there is very little current out of the channel of the rivers; and as the grade line is established at such an elevation that it cannot be overtopped, there is no danger to be apprehended of

the destruction of the embankment. There is but one source of danger—it is from the ravages of the Mississippi upon its banks, threatening to extend its inroads as far as the embankment.

That the bank has wasted to some extent, is certain; but the river now shows a disposition to remain stationary; and this, in that river, is generally followed by recession. In the event, however, of the waste continuing, I am assured by Mr. D. B. Holbrook, the person most concerned in Cairo city, that immediate steps would be taken to curb it; and the result of proper measures to effect this will not admit of doubt. Should an expenditure for this object become necessary, and the protection of State property become involved therein, it will be a subject for your consideration whether the public should not make a pro rata appropriation for their share of such security.

The termination of the Central railroad is the most remarkable point in the west. It is undeniably the head of low-water navigation for vessels of large size. A series of shoals or bars, commencing at Cash island, and extending at short intervals entirely up the Ohio river, prevents its navigation for long periods at a time when the growing commerce of the west requires it should be in the best order. This, in future, will cause a selection of that route for transportation which can always be confided in. The Mississippi always supplies that route to the mouth of the Ohio; and from thence advantage can be taken of our internal improvements for conveyance to the interior—or the smaller boats can freight from this point for the upper rivers.

The present situation of our commerce is too plainly seen, and too sensibly felt, to again admit of confidence in the Ohio or Mississippi rivers. For the shipment of produce this place has the advantage of any point above. The river below is seldom obstructed when all the rivers above are too low for navigation, or blocked up with ice.

From all these advantages, the interest is apparent which the State has in the proper ordering of this important point.

From the commencement of the road, embankment has been adopted through the country which has ever been overflowed, with the exception of 120 feet of tressle work, which was deemed necessary for waterway, across the cotton-wood slough.

The river Cash is crossed by a bridge, on the Jackson plan, of 104 feet span. The scarcity of stone throughout that region has caused a recourse to brick as a better and cheaper material than any other which can be obtained for the abutments and culverts. From the quality of the clay and the great degree of care which is required in their manufacture, a brick may be confidently expected which will far exceed the sandstone of the country in all the excellencies of a material.

Where the low land stops there is a range of hills stretched across the course of the line, and extending several miles both east and west. To pass this range, a point was selected where a creek running north, and one whose course was south, headed together; and, as the ridge was here lower and narrower than at any other place, the road, on leaving Cairo, was directed and located towards it. The valleys of the before mentioned creeks were occupied by the line, and the ridge passed by an excavation.

Having overcome this obstacle, the line runs on good ground for many

miles. The only obstacle of consequence is the crossing of Cash river. During heavy floods, from the great extent of country which it drains, and its abrupt character, there is an immense quantity of water in the river and its overflown flats. For its free passage there is provision made for 800 feet of tressle work; only a part of this is strictly necessary for waterway—the rest was adopted through motives of economy.

The termination of the line under contract is about four miles north of Cash river; from there the location is extended northward; and as there is found to be branches of Cash in a favorable general direction, every advantage is taken of them to attain the main summit of the country. From there, the ridge dividing the waters of the Ohio from the Mississippi river is located on to the course of Drury creek, which runs northerly to near Muddy river.

The line from Drury is not yet located, but from a careful examination of the country in every direction, it is positively ascertained that a line at once direct and excellent is attainable.

Before selecting the route for location in the southern part of the State, a careful examination was made of the country; and on one which was much the most preferable, an instrumental survey was made. As I anticipated, the general difference was not very great; but two or three positively objectionable features caused it to be rejected. The route up the bank of the Mississippi and Muddy river was also examined, and found unfavorable.

The country for many miles east of the line is very broken, and no line which could compare in advantages with the present one could be obtained. The entire line runs through a fine fertile country, capable of supporting a very dense population, which will be able to supply a vast amount of transportation for surplus products on this line of road.

At the Vandalia end, the line, after leaving the town, deflects to the east until the river Kaskaskia is crossed, and then its direction is changed to the south.

In crossing the river bottom, an embankment is adopted. The indispensable ways for the passage of water, in time of floods, are formed of tressle work, placed across the sloughs and creeks running into the river below the road. The aggregate length of this kind of work is 510 feet. The abutments of the bridge at Kaskaskia river are designed of brick, with stone foundations. The stone to be obtained at this point is a fine quality limestone, but its cost cannot be less than three times that of brick, and would be but little more durable.

In the formation of embankments, the width of fourteen feet is given at grade, by the special orders of the Board.

The slopes are generally $1\frac{1}{2}$ to 1; ditches at the side are laid off at five feet distance from the foot of the embankment, where earth is required from such source, with the exception of that part in the Kaskaskia river bottom, where the ditch on the left side is ten feet from the embankment.

The ground occupied by embankment, under six and a half feet in height, is thoroughly grubbed, and no vegetable or perishable matter is admitted in such work.

Excavations are 15 feet wide at grade—the slopes under ten feet are

generally 1 to 1, but over that depth they must be greater. It will be found necesary at one point, viz., the ridge in Alexander county, to have open brick drains on each side of the excavation to prevent the gullying which would be certain to take place without this precaution.

The plan of superstructure is a combination of foundation sills, cross-ties, and longitudinal string pieces for rails, plated with iron, spiked firmly to the stringers and joint pieces under the joist pieces of the foundation sills.

Timber in great abundance and of fine quality exists along the line as high as Muddy river, and at no part will it be difficult to be obtained at a moderate expense.

I have the honor to be

Your most obedient servant,

J. FREEMAN,

Principal Engineer Central Railroad.

Statement showing the quantities of work now under contract on the Central Railroad south of Vandalia, together with the engineer's estimate, and the cost at contract prices.

No. of contract.	Quantities of work.	Description of work.	Engineer's estimate.			Contract price.	
				Per	Amount.		Amount.
Contract No. 1.	3¼ sq. chains	Grubbing - -	\$40 00	chain	\$130 00	\$35 00	\$113 75
	316¾ do.	Clearing - -	10 00	chain	3,167 50	7 00	2,449 00
	200,000 yds	Embankment - -	23	yard	46,000 00	20	40,000 00
	57 cubic do.	Brick work, culvert No. 1. - -	5 00	"	285 00	5 50	313 50
	63 do.	Culvert No. 2 - -	5 00	"	315 00	5 50	346 50
					\$49,897 50	-	\$43,222 75
Contract No. 2.	2 sq. chains	Grubbing - -	35 00	chain	70 00	30 00	60 00
	368 do.	Clearing - -	9 00	"	3,312 00	8 00	2,944 00
	210,700 yds.	Embankment - -	23	yard	48,461 00	19	39,973 00
	120 lin. feet	Tressle work - -	10 00	foot	1,200 00	9 00	1,080 00
	barrel	Drain - -	-	-	10 00	-	10 00
					\$53,053 00	-	\$44,067 00
Contract No. 3.	5½ sq. chains	Clearing - -	8 00	chain	44 00	8 00	44 00
	11,100 yards	Embankment - -	16	yard	1,776 00	15	1,665 00
	1,834 do.	Brick in mortar - -	5 00	"	9,170 00	5 00	9,170 00
	483 do.	Brick in cement - -	6 00	"	2,898 00	6 00	2,898 00
		Foundation timber and planking - -	-	-	110 62	-	110 62
		Pumping and scooping - -	-	-	100 00	-	100 00
	1,443 yards	Excavation - -	10	yard	144 30	12	173 16
	104 feet	Bridge - -	27 02	-	2,811 00	44 00	4,576 00
					\$17,053 92	-	\$18,736 78
Contract No. 4.	19½ sq. ch.	Grubbing - -	30 00	chain	585 00	25 00	487 50
	268½ do.	Clearing - -	7 00	"	1,879 50	6 00	1,611 00
	46,865 c. yd.	Embankment - -	18	yard	8,435 70	17	7,967 05
	2,183.5 do.	Excavation - -	14	"	305 69	14	305 69
	20 lin. feet	Bridge - -	-	each	275 23	-	91 48
	10 do.	Bridge - -	-	each	84 13	-	38 22
	5 feet	Culvert - -	-	each	189 20	-	207 70
		Small drain - -	-	each	10 00	-	10 00
	44¾ yards	Brick work - -	*4 75	-	-	6 00	268 50
					\$11,764 45	-	\$10,987 14
Contract No. 5.	18.6 sq. ch.	Grubbing - -	30 00	chain	558 00	30 00	558 00
	310 do.	Clearing - -	7 00	"	2,170 00	7 00	2,170 00
	41,917 c. yd.	Embankment - -	20	yard	8,383 40	17	7,125 89
	126,906 do.	Excavation - -	28	"	35,533 68	22½	34,553 85
	3-10 feet	Bridges - -	84 13	bridge	252 39	80 00	240 00
	3-3 feet	Culverts - -	150 00	culv't	450 00	160 00	495 00
					\$47,347 47	-	\$45,142 74

*Included in bridge.

Statement of work under contract on the Central Railroad—Continued.

No. of contract.	Quantities of work.	Description of work.	Engineer's estimate.			Contract prices.	
				Per	Amount.		Amount.
Contract No. 6.	46.6 sq. ch'n	Grubbing - - -	\$35 00	chain	\$1,631 00	\$33 00	\$1,537 80
	484 do.	Clearing - - -	8 00	do.	3,872 00	8 00	3,872 00
	24,229 yards	Embankment - - -	17	yard	4,118 93	16	3,876 55
	4,973 do.	Excavation - - -	15	do.	745 95	14	696 22
	10 feet	Bridge - - -	-	each	84 13	ft. 8 50	85 00
	3 do.	Culvert - - -	-	do.	150 00	-	165 00
	2 Barrel	Drains - - -	-	do.	24 00	12 00	24 00
20 lin. feet.	Tressle work - - -	-	7 50	feet	150 00	10 00	200 00
					\$10,776 01	-	\$10,456 57
Contract No. 7.	23.3 sq. ch.	Grubbing - - -	38 00	chain	885 40	35 00	815 50
	324 do.	Clearing - - -	9 50	do.	3,078 00	9 00	2,916 00
	38,338 yards	Embankment - - -	25	yard	9,584 50	20	4,000 00
	2,215 do.	Excavation - - -	15	do.	332 25	18	3,300 00
	10 feet	Bridge - - -	-	-	90 00	ft. 9 00	90 00
	760 do.	Tressle work - - -	9 00	foot	6,840 00	9 00	6,840 00
	40 do.	do. - - -	8 00	do.	320 00	8 00	320 00
					\$21,130 15	-	\$18,613 75
Contract No. 8.	39.5 sq. ch.	Grubbing - - -	28 00	chain	1,106 00	25 00	987 50
	190½ do.	Clearing - - -	6 50	do.	1,236 62	6 00	1,141 50
	6,308.73 yd.	Excavation - - -	16	yard	993 39	14½	869 22
	37,278.07 do.	Embankment - - -	16	do.	5,964 49	15½	5,778 10
	15 feet	Bridge - - -	-	-	74 25	ft. 12 00	180 00
	49½ yards	Brick work - - -	4 75	yard	235 91	5 00	248 33
	5 & 3 feet	Culverts - - -	132 50	each	132 50	5 75	264 62
	49½ yards	Brick work - - -	115 00	do.	115 00	5 75	264 62
					\$9,858 16	-	\$9,469 27
Contract No. 1. B.	12.9 sq. ch.	Grubbing - - -	25 00	chain	322 50	25 00	322 50
	105 do.	Clearing - - -	5 50	do.	577 50	5 50	577 50
	13,791 c. yd.	Excavation - - -	23	yard	3,171 93	19	2,620 29
	101,000 do.	Embankment - - -	16	do.	16,160 00	15	15,150 00
	110 lin. feet	Tressle work - - -	8 00	foot	880 00	8 00	880 00
	286 c. yards	Brick in mortar - - -	5 00	yard	1,340 00	6 00	1,608 00
	98 do.	Brick in cement - - -	5 50	do.	539 00	7 00	686 00
	62½ do.	Culvert - - -	5 00	do.	312 00	7 00	437 50
	32 perch	Stone masonry - - -	15 00	perch	480 00	17 00	544 00
						\$23,782 93	-	$22,825 79
Contract No. 2. B.	19.3 sq. ch.	Grubbing - - -	25 00	chain	475 00	25 00	475 00
	195 do.	Clearing - - -	5 50	do.	1,272 50	5 50	1,272 50
	10,444 c. yd.	Excavation - - -	18	yard	1,879 92	17½	1,827 70
	87,848 do.	Embankment - - -	16	do.	14,055 68	15	13,177 20
	400 lin. feet	Tressle work - - -	8 00	foot	3,200 00	8 00	3,200 00
					\$20,883 10	-	\$19,952 40
23 miles	Timber for super-structure - - -	1,443 40	mile	\$33,193 60	1,613 00	\$37,099 00	

Table of Grades on the located line of the Central Railroad.

No. of Grade.	Commences.	Ends.	Length of grade.	Rate per mile.	
	<i>Miles, feet.</i>	<i>Miles, feet.</i>	<i>Miles, feet.</i>		
1	Ohio river.	7 4640	7 4640	-	Level grade.
2	7 4640	8 3860	4500	20.592	Ascending.
3	8 3860	9 2080	3500	21.120	Ascending.
4	9 2080	10 4050	1 1970	40.000	Ascending.
5	10 4050	11 3120	4350	40.000	Descending.
6	11 3120	12 0740	2900	31.838	Descending.
7	12 0740	12 5240	4500	17.582	Descending.
8	12 5240	13 3160	3200	-	Level grade.
9	13 3160	13 5260	2100	9.979	Ascending.
10	13 5260	14 4780	4800	3.484	Descending.
11	14 4780	15 2900	3400	8.553	Descending.
12	15 2900	16 2120	4500	-	Level grade.
13	16 2120	16 4620	2500	7.392	Ascending.
14	16 4620	17 3340	4000	5.280	Descending.
15	17 3340	18 3060	5000	1.584	Ascending.
16	18 3360	20 0900	1 2220	-	Level grade.
17	20 0000	20 1200	1200	19.800	Ascending.
18	20 1200	20 3900	2700	8.791	Descending.
19	20 3900	21 3420	4800	6.072	Ascending.
20	21 3420	23 0860	1 2720	7.920	Ascending.
1	Vandalia.	3700	3700	40.000	Descending.
2	3700	4400	700	-	Level grade.
3	4400	6600	2200	23.126	Descending.
4	6600	4 1180	2 4340	-	Level grade.

Table of Curves and Tangents on the located line of the Central Railroad.

No. of curve.	Commences.		Length of curve.	Radius of curvature.	No. of tangents.	Commences.		Length of tangents.
	Miles, feet.	Miles, feet.				Miles, feet.	Miles, feet.	
1	900	1 2420	1 1520	6,000	1	Ohio river	900	900
2	7 2167	7 4375	2308	8,000	2	1 2420	7 2167	5 5027
3	9 2380	9 3080	700	5,000	3	7 4375	9 2380	1 3285
4	10 0500	10 1200	700	1,200	4	9 3080	10 0500	2700
5	10 3400	10 4600	1200	1,255	5	10 1200	10 3400	2200
6	10 4600	12 1090	7050	8,000	6	12 1090	14 0342	1 4532
7	14 0342	14 4780	4438	5,200	7	14 4780	18 4110	3 4610
8	18 4110	19 0680	1850	8,000	8	19 0680	20 0000	4600
9	20 0000	20 3400	3400	6,000	9	20 3400	22 0990	1 2870
10	22 0990	22 2840	1850	2,000	10	22 2840	23 0990	3300
1	100	1000	900	1,500	1	Vandalia	100	100
2	4359	5480	1121	2,000	2	1000	4359	3359
					3	5480	4 1180	3 0980

Statement of work performed on the Central Railroad from Cairo city to Vandalia, up to the 6th November, 1838.

No. of contract.	Clearing.		Grubbing & clearing		Excavation.		Embankment.	
	Quantity in chains.	Cost.	Quantity in chains.	Cost.	Quantity in cubic yards.	Cost.	Quantity in cubic yards.	Cost.
1	198	\$924 00	-	-	-	-	-	-
2	253	1,282 66	-	-	-	-	1,433	\$286 60
3	3.5	33 00	-	-	-	-	1,080	205 20
4	258.15	786 60	6.85	\$114 16	-	-	990	168 30
5	296.55	1,477 06	20.7	414 00	13,208	\$2,971 79	37	6 29
6	284	2,970 66	42.40	1,130 80	-	-	4,714	754 24
7	310	1,956 00	13.75	367 50	-	-	-	-
8	126.5	336 75	2.75	48 96	-	-	775	117 02
1 B	102.5	375 83	3.5	87 50	-	-	-	-
2 B	30	123 75	.5	12 50	-	-	-	-
Total amount.								\$17,151 17

NOTE—The clearing is in various stages of progression—from two-thirds to full completion. Grubbing is also incomplete.

VANDALIA, December 24, 1838.

Upon the recent receipt of the order of the Board of Public Works, directing me to take charge, as principal engineer, of the Alton and Shawneetown railroad in the third circuit, I repaired to that work and made such examinations as my brief time allowed.

This work has been placed under contract from Shawneetown to Equality, and is in a very forward state. I herewith present a statement of the amount of work done to the time of the last estimate.

The general and fatal prevalence of disease on this line, extending to all of the assistant engineers, has necessarily prevented them from preparing detailed accounts thereof. As soon as possible, complete statements shall be prepared and presented.

I have the honor to be,

Your most obedient servant,

J. FREEMAN,

Principal Engineer Central and Alton and Shawneetown Railroad.

Statement showing the amount of work done on the Alton and Shawneetown Railroad, in the third circuit, to the 22d of November, 1838.

	Grubbing and clearing ten sections, incomplete	\$5,065 00
	Grubbing and clearing main ditch	30 00
	Grubbing and clearing swamp ditches	12 00
41,722.52	yards excavation from road-bed	5,838 18
2,722.85	yards excavation from ditches	381 19
1,348.20	yards excavation from cemented clay	307 44
326.66	yards excavation for depot formation	81 67
3,071	yards excavation from rock	3,838 75
47,926.68	yards embankment moved 100 feet	7,523 16
283.58	perches rough masonry	955 65
439.38	perches dressed masonry	2,516 59
643	perches stone delivered	1,115 50
393	feet of stone delivered for hewing	196 50
	Locust posts	125 37
281.26	rods of drain ditches for swamps	218 26
	Timber, foundation for culvert	30 00
38	barrels lime	52 25
44,302	feet b. m. timber for tressle work	797 42
	Total amount	29,147 93

EXHIBIT No. IV.

REPORT OF M. K. ALEXANDER,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, December 3, 1838.

To the BOARD OF COMMISSIONERS
of Public Works of the State of Illinois.

The undersigned, Commissioner of the Board of Public Works for the fourth judicial circuit, respectfully submits to the Board the following report of his proceedings on the several works assigned to him, in special charge, as acting Commissioner thereon, during the last six months—say to the first of the present month, viz.

GREAT WABASH RIVER.

Before entering into any detail, it may be proper to state that since the passage of the internal improvement law of this State, the State of Indiana has added fifty thousand dollars to her former appropriation for the improvement of this river, making her appropriation equal to this State.

The contract for the delivery of stone at the Grand rapids, for the construction of the lock at that point, which was entered into in the latter part of 1837, was not prosecuted with that degree of energy and efficiency that would justify the Commissioners in granting an extension of the time originally given for the completion of the work. The contracts were, therefore, abandoned by the contractors after the delivery of about 800 cubic yards of rock.

During the summer the necessary arrangements were made by the engineer for letting the contract for the dam and steamboat lock at the rapids on the plan heretofore submitted to the Board; and on the 22d of August last, the letting of that work took place at Mt. Carmel. There was much competition in the bids of contractors of the first reputation in the country. The work was taken by competent contractors, and at fair prices. The contract price of the work varies but little from the estimate of the engineer on file in the office of the Board, and the aggregate amount falls below the joint appropriation made by the two States.

The contractors have commenced work, and every assurance is felt that this improvement, with which is identified the interest and prosperity of one of the richest and most extensive agricultural valleys of the west, will be speedily prosecuted to completion.

As soon as the proper season arrived, the engineer in charge of this work organized a party and commenced a thorough examination and survey of the river from the foot of the rapids to its junction with the Ohio; and the extraordinary low stage of water which has prevailed during the autumn, afforded great facility in ascertaining the nature and extent of the obstructions to the navigation. His report of this survey and examination is daily expected, and will, on its receipt, be laid before the Board. A very full and interesting report of the obstructions at the Grand rapids, and the necessary improvements to overcome these obstructions, has already been made by the engineer on that work, as well as the estimated cost of the same, which are on file, and to which you are respectfully referred for information relating to that important work.

The amount of the former appropriations for the improvement of this river, which remained unexpended in the hands of the Commissioner, at the time the undersigned took charge of the business, as appears from his last settlement, was \$5,534 95, which has been received by the undersigned, and \$951 12 has been paid out on contracts made by his predecessor, leaving \$4,583 83 to be applied under the present internal improvement law.

The disbursements on the Great Wabash river improvements, under the present internal improvement laws, up to the first of this month, so far as vouchers have been received by the undersigned, are as follows, viz.

Paid by Thos. H. Blake, Commissioner on the part of Indiana, for outfit of engineering corps, surveys, engineering, &c.		\$1,792 61	
On account of engineer's estimate, No. 1, of stone delivered	- - - - -	4,093 00	
		<hr/>	
		5,885 61	
Deduct amount received for a canoe and axe		3 44	
		<hr/>	\$5,882 17
Disbursements by the undersigned on the part of this State, for outfit of engineering party, engineering and incidental expenses		3,871 26	
On account of estimate No. 2, of stone delivered		2,316 00	
		<hr/>	
		6,187 26	
Credit by axe and canoe sold	- - - - -	3 44	
		<hr/>	6,183 82
Whole amount of disbursements	- - - - -		<u>\$12,065 99</u>
Drawn on foregoing work by special draft	-	2,316 00	
Paid over by former Commissioner	- -	4,583 83	
		<hr/>	<u>\$6,899 83</u>

EASTERN DIVISION OF THE SOUTHERN CROSS RAILROAD FROM ALTON TO MOUNT CARMEL.

The graduation of eighteen miles of this work from Mt. Carmel to Albion, which was let on the 18th of March last, is in a state of forwardness, and there is no doubt of its completion for the reception of the railway within the time limited in the contract, as several sections have already been completed, and given up by the contractors; and all the others are now being efficiently prosecuted.

The contractor for the delivery of the timber for the superstructure has not progressed with his contract as could have been desired; but every assurance is given of the requisite exertion to fulfil the contract before the expiration of the time limited for its completion. He alleges the detention during the fall, occasioned by the failure to receive the engine designed for the work, in consequence of the continued low stage of the water during the past season, and other causes beyond his control, as an apology for his delay of the work, all of which will soon be removed; and the hope is entertained that his promises to fulfil the contract in due time will be fully complied with.

The graduation of the Little Wabash sections of this road, embracing the crossing of the river and three miles of heavy work in the vicinity, which were ordered to be put under contract at the last meeting of the Board, was let on the 18th of October last. The estimated cost of this work, exclusive of the bridging over the river, was

- \$24,099 75	
Bridge abutments and other work not let	- 7,696 00

\$31,795 75

The first of the above items of work was let to efficient contractors at prices below the estimates; but the letting of the masonry was deferred until more minute examination could be made for suitable materials for the work

An engineering party was organized in the month of August to make the necessary examination and definite location of the above portions of the line, and the whole route between Albion and Fairfield was minutely examined, in order to arrive at a correct location of this detached portion directed to be let; and, from the information collected in the survey, very little labor or expense, hereafter, will be necessary to prepare the whole line between the above mentioned towns for contract. The report of the engineer definitely locating this portion of the work is herewith submitted.

For more particular information relative to the first eighteen miles of this road from Mt. Carmel to Albion, which were put under contract on the 8th of March last, your attention is invited to the report and estimate of the principal engineer of the southern district, of the cost of this portion of the work, which is herewith submitted. A tabular statement, showing the progress made on this division of that work, is also submitted.

After completing the examinations, and the location of the Little Wabash sections of this road, as already mentioned, the same party of engineers was sent to the Kaskaskia river division, to make the definite

location of the sections ordered by the Board to be let at the crossing of that river. The expenses of the party, during their engagements in both circuits, have been paid by the undersigned, and the amount is included in the subjoined account, viz.

For outfit of engineering parties, and incidental expenses prior to June, 1838	-	\$1,931 77	
For right of way, land entered, engineering and incidental expenses since that date	-	4,211 67	
		<u> </u>	\$6,143 44
For construction prior to June, 1838	-	4,380 40	
Since that date	-	32,412 98	
		<u> </u>	36,793 38
Chargeable to this work, money drawn from the general fund	-	-	858 73
			<u> </u>
			\$43,795 55
Drawn on the foregoing work in cash	-	-	\$20,000 00
By special drafts	-	-	9,166 19
			<u> </u>
			\$29,166 19

GREAT WESTERN MAIL ROUTE.

The contracts on the eastern division of this work, which were let prior to the last meeting of the Board, were confined principally to the Purgatory swamp, the Little Wabash river bottom, and bottom land, and the bridging of some other streams on the route. These portions of the road being subject to inundations, the operations of the contractors were seriously retarded by the floods which occurred in the spring and early part of the summer; and, subsequently, by the unusual degree of sickness which has prevailed at these points during the summer and fall months. To these unavoidable causes, the delay which has taken place on these contracts is chiefly to be attributed, and the consequent inability of the contractors to complete the work by the first of November last, agreeably to contract. The several jobs which were to have been completed on that day are, however, in a state of forwardness; and the contractors are considered fully responsible and disposed to progress with the work as rapidly as circumstances will allow; and assurance is felt that the jobs will be completed early in the spring.

In the month of August last all the remaining portions of this road, not previously let, were put under contract, and the work is now progressing. The contract prices of these jobs cannot be ascertained precisely, as it will depend upon the amount of work directed to be done on the respective contracts. The contracts are specific as to the price of each item of work embraced, but with a reservation to the agents of the State to direct what specific portions of the work shall first be executed by the respective contractors. It is supposed, from the estimates of

the engineer, that the appropriations will be sufficient to bridge all the streams, and construct causeways over the bottom lands; and also to put in good travelling condition the residue of this road.

The present bridges over the Embarrass river, at Lawrenceville, and over the Little Wabash river and Muddy fork, in Clay county, are individual property. As the jobs of work immediately contiguous to these bridges will require a large expenditure to execute them; and as it will be necessary that they should be kept constantly in repair by the State, they would seem to be the proper point for the erection of toll-gates—and, consequently, it is highly expedient that the State should own them in connection with the road. The suggestion is, therefore, respectfully submitted, whether there should not be an application to the Legislature for authority to enable the Board to purchase or otherwise procure the control of these bridges for the use of the State. It is also worthy of remark that the bridge over the Little Wabash, as at present constructed, forms a serious obstruction to the navigation of that river. The bridges over the Big Muddy and the Little Wabash rivers are on a very cheap plan of construction, and being in rather a dilapidated state, will soon require rebuilding; consequently the value of the vested rights of their owners in keeping toll-gates at these sites would be the principal matter to be adjusted by the agents of the State. At the letting of contracts on the 18th of August last, very favorable bids were received from an efficient and practical bridge builder for the erection of new bridges over the two last mentioned streams; but owing to the existing rights of the owners of these bridges, these bids were suspended until the action of the Board, or the Legislature, could be had on the subject of those rights.

For a detailed description of the work already done, and of that necessary to be done on this road, and the probable cost of the same, you are referred to the accompanying tables, drawings, profiles, and estimates of the engineer; and also those now on file in the office.

The Purgatory division of the western mail route embraces the flat country lying between the Wabash and Embarrass rivers—a distance of about seven miles. A considerable portion of this delta, between these two rivers, is subject to inundation during floods. The Great Wabash, during its higher stages, discharges through a low depression in its western bank, some miles above Vincennes, which is called *Bellgrave*; and the whole of the flat country between this point and the mouth of the Embarrass river is flooded by the waters of the Great Wabash. This subjects the embankments, which are made to elevate the road above high water mark, to the action of the current and waves of a great expanse of water, and renders the prospect of making a permanent improvement very doubtful, without great expense. It is suggested, therefore, that the best and most economical plan of effecting a substantial improvement over this part of the road, would be to construct a levee at Bellgrave, to exclude the floods of the Wabash. This plan, if carried into effect, would reclaim a large tract of valuable land, and increase the healthfulness of the country; and would render any improvement made on the road entirely permanent. It is, therefore, respectfully suggested to the Board, that the propriety of constructing this levee be also laid

before the Legislature. As much of the land as this improvement would reclaim belongs to the General Government, and without it, would so remain, it is but reasonable to presume that, upon proper representation being made to Congress, through the Legislatures of Illinois and Indiana, (both States as well as the General Government being mutually interested in the great western mail route,) that a portion of these inuncated lands would be granted to effect the improvement contemplated.

The amount expended by the undersigned on the Purgatory swamp division of this road, is as follows, viz:

Prior to June, 1838	-	-	-	\$5,129 76
Since that date	-	-	-	7,235 16
Chargeable to this work from the general fund	-	-	-	247 29
				<u>\$12,612 21</u>

The disbursements on the Little Wabash bottom sections are as follows, viz:

Prior to June, 1838	-	-	-	\$4,353 47
Since that time	-	-	-	3,091 01
Chargeable from general fund	-	-	-	119 08
				<u>7,593 56</u>

The residue of disbursements chargeable to the general appropriations for this work, has been made on that part of the work lying east of the Marion county line, and is as follows, viz:

For construction prior to June last	-	-	-	\$2,803 24
Since that time	-	-	-	3,484 03
				<u>6,287 27</u>

For engineers, superintendents, &c. on the whole eastern division prior to

June, 1838	-	-	-	\$180 24
Since that date	-	-	-	1,347 38
Chargeable from general fund	-	-	-	156 29
				<u>1,683 91</u>

7,971 18

Whole amount of monceys expended on this work

28,176 95

Drawn by the undersigned on the foregoing work, in cash

34,000 00

By special drafts

2,595 76

\$36,595 76

CENTRAL BRANCH RAILROAD.

The grading on the eastern division of this work has been efficiently prosecuted. Several sections have been finished and delivered up by the contractors, and the remainder is so far advanced as to require but a short time next spring to complete the whole work; as the remaining work to be executed is, for the most part, of a description that can be carried on during the winter. The contract for the delivery of materials for the superstructure is progressing satisfactorily; and from the present indications no reasonable doubt can be entertained of a faithful execution of the engagement of the contractors.

The grading of the two miles, embracing the crossing of the Embarrass river in Coles county, which was ordered by the Board at their June meeting to be put under contract, was let to efficient and responsible contractors, and the work has been commenced and is progressing. The letting of the stone work for the bridge was suspended for the purpose of submitting to the Board the question, whether foundation piers or abutments shall be adopted. It is represented by the engineers who have been employed on that work, that the prospect is favorable for procuring a good quality of stone in the vicinity of the work. Yet, under the most favorable circumstances, the quantity required to carry the stone work up to the grade line of the road, is so great that it must necessarily swell the cost of the work to a very considerable amount.

The disbursements on this road up to the 1st instant, are as follows, viz:

For outfit of party of engineers locating from the Wabash river to Shelbyville, including all other incidental expenses prior to June, 1838	-	-	-	-	\$1,831 15	
Since that date	-	-	-	-	2,124 41	
						<u>\$6,955 56</u>
For construction prior to June last	-				4,772 64	
Subsequent to that date	-	-			34,970 03	
Chargeable to this work from general fund	-				4,504 82	
						<u>41,247 49</u>
Total	-	-	-	-		<u>51,203 05</u>
Drawn on the foregoing work, in cash	-					50,000 00
By special draft to contractor	-					1,155 25
						<u>\$51,155 25</u>

NORTHERN CROSS RAILROAD.

None of the contracts for the graduation on this line have been completed and the work delivered up by the contractors, although several sections are finished, as a number of sections are embraced in one contract, and it requiring a completion of each and every section before the contract can be considered completed and the work received. The heavy work at the crossing of the Vermilion river is in the hands of efficient contractors, and every expectation is entertained that the work will be executed in a skilful and substantial manner and in proper season.

The contract for the delivery of timber for the superstructure of the railway has been abandoned by the contractors, and will have to be relet by the acting Commissioner before any thing more will be done on it.

Before giving the disbursements on this road, you will allow me to suggest to the Board the propriety of recommending the adoption of some measure to secure the extension of this road and also of the Central branch railroad to the Wabash river. The importance of making immediate provision for the extension of these two great works from the State line to the Wabash river, and thus connect them with the Wabash and Erie canal, is obvious from the fact that the portions of these roads now under construction cannot be profitable to the State until these connecting links are made. Three plans have suggested themselves to me for

effecting this object; first, and perhaps the preferable one, to ask Indiana to undertake the work and own and control it; the second is, to ask of Indiana the right of way for this State to extend these roads and add them to our system; and the third, and least desirable is, to effect these essential connections by chartered companies, under the Legislature of Indiana.

The disbursements on this (Northern Cross) road, are as follows, viz:

For outfitting engineering party to locate the line of road from the State line to Decatur, including incidental expenses, prior to June, 1838	-	-	-	-	\$4,413 27	
Subsequent to that date	-	-	-	-	1,720 88	
						<u>\$6,134 15</u>
For construction	-	-	-	-	32,436 18	
Chargeable to this work from the general fund					3,710 52	
						<u>36,146 70</u>
						<u>42,280 85</u>
Drawn on the above work	-	-	-	-		<u>45,640 26</u>

CENTRAL RAILROAD.

So much of this line of work as lies between Vandalia and Decatur, and which was attached to the eastern district, has been surveyed and located, and the estimates and drawings made and filed in the office of the Board. The disbursements on account of this work, are,

For outfit of engineering party and incidental expenses, prior to June, 1838	-	-	-	-	\$1,798 42	
Since that date	-	-	-	-	162 50	
Chargeable to this work from general fund	-	-	-	-	392 18	
						<u>2,353 10</u>

The whole amount disbursed by the undersigned, chargeable to the general fund, is	-	-	-	-	\$10,193 91	
Subject to a deduction for horse and wagon sold, of					175 00	

Showing the actual amount distributed on the several works, to be	-	-	-	-	\$10,018 91	
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For a minute and detailed estimate of the cost of the three last mentioned roads, together with the necessary depots, damage for the right of way, engineering, contingent expenses, &c. &c., your attention is directed to a report of the principal engineer of the eastern engineering district, made on the first of last June, and which may be seen on file in the office.

Your attention is also invited to an interesting and detailed tabular statement, showing the progress made by contractors on the portions of the Central Branch road, and the Northern Cross road which are under contract, and also the work yet remaining to be done, as well as various other items of information in relation to these works, which is herewith submitted.

RECAPITULATION.

	Drawn.	Disbursed.
On Great Wabash river, from former Commissioner - - \$4,583 83		
Special draft - - 2,316 00		
	\$6,899 83	\$6,183 82
On Southern Cross railroad,		
in cash - - 20,000 00		
Special drafts - - 9,166 19		
	29,166 19	42,936 82
On Mail route, in cash 34,000,00		
Special drafts - - 2,595 76		
	36,995 76	27,624 29
On Central Branch railroad,		
in cash - - - 50,000 00		
Special draft - - - 1,155 25		
	51,155 25	46,698 23
On Northern Cross railroad,		
in cash - - - -	45,640 26	38,570 33
On Central railroad - - - -	-	1,960 92
On the general fund - - - -	8,500 00	10,018 91
	177,957 29	173,993 32
Showing a balance now on hand and un- expended, of - - - -	-	3,953 97

It will appear from the foregoing that, on some of the works, a much larger amount has been drawn than disbursed, while others are considerably in advance in disbursements of the amounts drawn; the cause of which is, that when funds have been wanted, they have been drawn on the work most in arrears, and have been applied on any of the works under the superintendence of the undersigned, where funds were needed.

The engineering parties in this judicial circuit have been reduced as low as practicable, to correspond with the limited operations of the contractors during the winter months on the several works under his charge.

It was expected by the undersigned, at the time of his last report, that all the plans, profiles and drawings belonging to the eastern engineering district, would have been completed by this time; but, owing to sickness and other causes, the draughtsman has several times been required to leave the office and perform field duties; in consequence of which some of the drawings are yet unfinished. They will, however, all be completed in time for field operations in the spring.

All of which is respectfully submitted.

M. K. ALEXANDER,

Commissioner Board of Public Works Fourth Judicial Circuit, Ill.

An abstract of the contracts let on the eastern division of the Great Western Mail Route, between the east line of Marion county and the Big Wabash river, opposite Vincennes. (Referred to in the report of the Principal Engineer.)

Description of section.	Length in miles.	Contractors' names.	Date of contract.	Engineer's estimate.	Amount of work done.	Amount paid.	Remarks.
Section No. 1	5.00	William Cooper,	August, 1838.	\$1,635 80	\$267 65	\$214 12	
" " No. 2	4.00	Urial Mills,	do.	1,049 80			
" " No. 3	9.00	Same	do.	1,036 10	206 25	185 00	
" " No. 4	2.50	Same	do.	925 18			
Little Wabash bridge, No. 5	-	George Knight,	do.	3,540 00	-	-	Contract suspended.
Big Muddy bridge, sec. No. 6	-	Same	do.	3,540 00	-	-	Contract suspended.
" " No. 7	4.00	Edward Clarke,	do.	1,234 54			
" " No. 8	3.00	Same	do.	2,406 82			
" " No. 9	5.00	Same	do.	1,680 20			
" " No. 10	5.00	Same	do.	1,680 30			
" " No. 11	5.00	Same	do.	1,103 10			
" " No. 12	3.00	Burd, Payne & Co.,	do.	1,948 65	252 00	201 60	
" " No. 13	5.00	Same	do.	2,125 57			
" " No. 14	2.50	Leach, Wade & Westfall,	do.	1,205 23	55 60	44 48	
Embarrass river,	1.00	Baker & Mays,	do.	6,288 92	632 15	506 12	
Rackoon creek section	-	Rodgers & Albright,	Sept. 8, 1837.	800 00	1,478 71	1,478 71	Finished and received.
Elm creek section	-	Same	do.	706 32			
Fox river section	-	Same	do.	2,700 00			
Little Wabash bottom section	-	Same	do.	12,331 00	2,982 30	2,982 30	Finished and received.
<i>Purgatory division.</i>							
Section 1	-	Reily, Nabb & Co.	do.	415 90	1,352 50	85 pr. cent.	
" " 2 & 3	-	Same	do.	-	4,345 07	"	
" " 4	-	Wheeler, Dubois & Co.,	do.	8,349 05	1,426 27	"	
" " 5	-	Reily, Nabb & Co.	do.	5,473 60	1,264 39	"	
" " 6	-	Wheeler, Dubois & Co.,	do.	6,430 00	870 60	"	
" " 7	-	Reily, Nabb & Co.,	do.	8,748 80	607 58	"	
" " 8	-	Wheeler & Dubois,	do.	4,773 36	4,122 32	"	

An abstract of the contracts let on the Southern Cross Railroad, between Mt. Carmel and Albion, and on the Little Wabash division.

Description of Sections.	Length in miles.	Contractors' names.	Date of contract.	Engineer's estimate.	Amount of work done.	Amount paid.	Remarks.
<i>Between Mt. Carmel and Albion.</i>			1838.	\$2,747 78	\$4,736 78	\$4,736 78	
Section No. 1	1.20	Gallagher & M'Bay,	March 9				
" No. 2	.80	Rodgers, Albright & Mills,	do.	2,949 49	1,591 66	1,273 33	
" No. 3	1.00	Same	do.	8,543 32	3,647 88	2,918 31	
" No. 4	1.00	Same	do.	5,548 48	737 74	590 19	
" No. 5	1.00	Same	do.	3,028 08	1,383 84	1,107 07	
" No. 6	1.00	E. P. Shannon & Co.,	do.	1,921 17	2,031 70	1,625 36	
" No. 7	1.00	Same	do.	1,825 79	1,672 50	1,338 00	
" No. 8	1.00	Murphy, St. Leger & Dun,	do.	3,542 05	4,590 67	4,590 67	
" No. 9	1.00	E. P. Shannon & Co.,	do.	3,534 66	3,912 79	3,912 79	
" No. 10	1.00	J. & P. Clarke,	do.	2,554 72	1,225 75	900 90	
" No. 11	1.00	Edward Clarke,	do.	1,780 27	1,517 09	1,213 87	
" No. 12	1.00	Same	do.	1,076 74	1,670 13	1,336 11	
" No. 13	1.00	Rodgers, Albright & Mills,	do.	2,567 35	1,144 72	915 78	
" No. 14	1.00	Same	do.	1,716 56	308 00	246 40	
" No. 15	1.00	Same	do.	2,013 74	388 50	310 80	
" No. 16	1.00	Edward Clarke,	do.	1,909 59	1,849 53	1,479 63	
" No. 17	1.00	E. P. Shannon & Co.,	do.	7,888 22	6,222 78	4,978 23	
" No. 18	1.00	Gallagher & M'Bay,	do.	2,639 45	2,360 54	1,808 44	
Superstructure for 18 miles	-	David Scott,	March 10	29,000 00	1,126 80	901 46	
<i>Little Wabash division.</i>							
Section No. 25	1.00	Kenner & Emerson,	Oct. 19	3,742 55	commenc'd		
" No. 26	1.00	St. Leger & Dun,	do.	6,377 05			
" No. 27	1.00	Same	do.	11,480 15			
Bridge abutment and bridges	-	-	not let	7,696 00			
Culvert bridges on sections	-	-	-	2,500 00			
No. 25, 26 & 27	-	Rodgers & Co.	-	-			

Section completed. The cost includes grading double track through town, and grading river depot—not included in original estimates.

Section completed. Cost enhanced by rock cutting not indicated on the surface.

Section completed. Cost enhanced by rock cutting.

Superstructure for 18 miles
Little Wabash division.

Bridge abutment and bridges
Culvert bridges on sections
No. 25, 26 & 27

*Report of David Burr, Engineer, of Indiana.*MOUNT CARMEL, ILLINOIS, *November 28, 1838.*To Gen. M. K. ALEXANDER and Col. THOS. H. BLAKE, *Com'rs.*

GENTLEMEN: In obedience to the instructions I have received from you, growing out of my engagements of the 24th June last, to take charge of the improvements contemplated in the Wabash river, I proceed to lay before you a report of the measures taken to advance that object.

Immediately after the 24th of June last, I repaired to this place, as the point presenting the most formidable obstacles to be overcome, to which I had been particularly directed as the field for operations, and commenced a general, though cursory, examination of the country in the vicinity of the Grand Rapids, and the river from Vincennes to the Ohio.

The operations now pressing forward in so many rivers in Kentucky and Pennsylvania, in preparing them for an uninterrupted navigation of steamboats, appear to point to that mode as the ultimate means which will, at no long period, be resorted to for all the large tributaries of the Ohio. With this distinctly in view, it was deemed necessary, as a preliminary step, before a plan could be adopted with judgment, to form opinions, approaching at least to correctness, of the practicability for improvements below, and the kind which would ultimately be used; so that the plans devised for the Grand Rapids might be in keeping and harmony with those which at some future period may be constructed between this place and the Ohio.

With slight exceptions, from Delphi to within ten miles of the junction with White river, the Wabash has a mild current, of good width, and tolerably well defined banks, which confine the waters to their natural bed, except in time of floods.

Below White river, evident changes are perceptible; the stream becomes expanded to something like double its former width, its course more serpentine—it crosses its lowest valley from side to side, which is from three to eight miles wide, and, in traversing the valley, changes its course frequently; forms cut-offs in the bends of the rivers, and rolls with its current vast volumes of sand. Between White river and Ohio, the sand rock of the country is found in the river bed at three places, viz: Coffee island, and at the Little and Grand Chains, and forms the ripples which have been improved by Messrs. Gardner and Mundy. At these places, where the rock occurs, the river is susceptible of almost any kind of improvement which the extensive and increasing trade of the country may require. The great value of the trade of the valley of the Wabash would in a short time induce a slack-water navigation of the river for the uninterrupted business of steamboats, if it were practicable to make each an improvement: but however desirable such an object may be, it is problematical at least—from the character of the country overflowed, in time of floods, from three to eight miles in width, with the bed of the stream constantly changing, and its current rolling volumes of sand sufficient in a few years to fill up its entire bed for a long distance—whether such a river can be generally converted into pools for slack-water navigation. In such an event it is doubtful. The process of filling up the pools would go on rapidly for a few years; and then to find way, the river

would seek a new channel, and leave such works as had been constructed on dry ground.

Although the probabilities are adverse for the grand improvement of the Wabash, by means of slack-water navigation in its whole length, it is certainly possible at some period, of time, that, at the shoals where the rock occurs, works of this kind may be erected; and this consideration, although remotely, had some weight in determining the plan for the works at the Grand Rapids.

The Wabash below White river, for the small class of Ohio steamboats, is navigable the greatest length of time in each year, and for a much longer period than it is above, owing more to the shoals, from the Grand Rapids to Little Rock, than want of water from thence to La Fayette. Many inquiries relative to the length of time during which the ordinary steam navigation is used yearly on the river, have been made, above and below the confluence of White river; but from the conflicting statements, it is difficult to form a correct opinion—the time varies, doubtless, in different years. During the present, there can have been but little or no time when the water has been too low for small steamboats to ascend the river to the rapids. A steamboat of ordinary light draft came there the last of October, when the water was depressed as low, probably, as it has been at any time this season. If it could have ascended the rapids, it might have made way for a long distance up the river. From the best sources of intelligence that could be obtained, it is believed that, when the improvements at Grand Rapids shall be completed, it will add three months, at least, in each year, to the time in which steamboats can now ascend the Wabash above the confluence of White river.

The obstructions proposed to be remedied by the the present improvements, are the series of shoals and rapids commencing one mile above the junction of White river—1st. The Grand Rapids—descent 4 feet in half a mile.—2d. The Hanging Rock rapids, $2\frac{1}{2}$ miles from the foot of the Grand Rapids—descent 1 foot seven inches in half a mile.—3d. Craon's ripple and the rapids at Ramseys' and Beedlo's mills, are next in succession, four and a half miles from Hanging Rock—descent 3 feet 2 inches from the surface of the water above the dam to Hanging Rock, the greatest part of which is within three-fourths of a mile of the dam. 4th. Little Rock rapids, from the head of which, in half a mile, is a descent of one foot and three inches; making in all a descent of ten feet. The water on the Little Rock shoals varies in depth, in low water, from four to one and a half feet.

In running the line of levels, the point of high water mark was assumed as the base line at the foot of the Grand Rapids, 21.57 feet above the surface of the water when the levels were taken.

The highest point of rock on the shoals at Little Rock was 12.97 feet below the base line; and in contemplating the proposed work, to give three and a half feet depth of water over the rock, the surface of the river must be raised to a point 9.47 feet above said base line, or, in even numbers, to nine feet six inches, which will be the point to which the weir or comb of the dam will be raised when it shall be built.

To determine the best plan of overcoming this descent in the river, several plans other than that of one dam and one lock, (the plan adopted)

suggested themselves. The first, if found practicable, was to introduce a feeder from White river on ground sufficiently elevated to lock, by means of a canal, into the Wabash above and below the rapids, and leave the bed of the river in its natural state, free for the great amount of trade passing in in flat and steamboats; another plan to make a canal from the upper part of the rapids, deep enough to be fed without throwing a dam across the Wabash, and in that manner leave the river free; a third one, to erect a dam at Hanging Rock to supply a canal to the foot of the rapids.

A slight examination sufficed to show the impracticability of the first and the inexpediency of the two last. The cost of construction was enough to decide the question: but if they could have been made for a much less sum, it is doubtful whether they should have been adopted. The steamboat trade of the Wabash is immensely valuable, and this cannot be well accommodated in a canal. The agitation of the waters produced by the motion of the steam vessels induces the necessity of paving the banks with stone, which injures the boats in their passage through them. Canals are obviously too narrow for the free operation of steamboats, whose motion in them is so constrained, and their progress so much impeded, that the utility of navigating canals by the agency of steam is a doubtful and unsettled question. The first of these canals would have been over seven miles in length, the latter over two.

These considerations were deemed sufficient to determine that the proposed works at the Grand Rapids should be by means of locks and dams across the Wabash, of the necessary height to give sufficient depth of water for boats to pass at all times the shoals and rapids in the first eleven miles above the mouth of White river; and whether one lock and one dam should be used for that purpose, or two, was the only question which remained undecided.

The height the waters require to be raised at the lower termination of the rapids, near White river, to give three and a half feet over the highest point of the river bed at Little Rock, in the lowest stages of water, is twelve feet. This height, on a good foundation, such as will be used, is not too great to render a dam unsafe; and as a single dam and lock are more economical and more convenient than to surmount the same rise of water by means of two, the use of one only should be preferred, provided the country is sufficiently elevated to sustain that height of water against the banks of the river.

In the event of building two dams, the site of the upper one would be at the Hanging Rock—the lower one near the foot of the Grand Rapids. The two sites are about two miles apart, and the water from the upper site to the extremity of the pool in the river above would be at the same elevation whether one or two dams should be erected. The only difference to the adjacent country in relation to the height of the water is for the distance between the two dams, which does not exceed two miles, and this difference in the height of the water would not be greater than three and a half feet; for, in order to give the necessary depth over the rocks for steamboats to enter the lock at Hanging Rock dam, a considerable portion of it would have to be submerged by the lower one. A dam at the foot of the rapids, to overcome the obstructions in the river to Hanging Rock, and to secure a sufficient depth of water to carry boats

safely into the second lock, would be seven and one-half feet in height above the surface of the river; and to overcome all the obstacles proposed to be remedied, less than ten and a half feet above the surface of the water where the dam will be built.

The greatest part of the descent of the Grand Rapids is within half a mile of the dam, so that the height to which the waters are raised above their natural bed is diminished four feet in that distance. The banks are high enough to confine the waters within them, except at the highest floods, during which the country is overflowed for miles in extent, with the exception of a few insulated points of sand-rock ridges, which appear like islands in the surrounding waters.

The difference, therefore, in the height to which the surface of the river will be raised by the use of one or of two dams is inconsiderable, not exceeding three and a half feet for two miles in distance; but to obviate all objections on that account, in the estimates, the cost of making guard-banks from the lower to the upper dam sites, on each side of the river, has been calculated and provided for. The difference in the height of the lock-gates and walls, on the plan of two dams, would have been three feet less than in one, provided the walls had been left at ten feet above the weirs or combs of the dams, and sometimes submerged in the waters of high floods; which, although avoided in the plan adopted, would not have rendered the works unsafe; with the banks raised to the proper height and well protected, and when the water was at that height, the dams would have made no obstruction to the passage of boats.

It is believed that all the advantages which can be claimed for two dams over one, are summed up in these items of the height of the water and the height of the lock-gates and walls—both are inconsiderable.

But the plan of one lock and one dam is preferable on account of producing less delay and injury to steamboats to pass one lock than to pass two; of less delay of landing flat boats and the hazard of being drawn over the dam in the descending trade of the river; of an increased amount of water-power, and greater economy in the cost of construction. It is usual to allow three feet for head and fall in building mills. On the plan of two dams, the difference in the surface of the water at Hanging Rock, above and below the dam, would have been only three feet, and therefore valueless for practical purposes. The available water-power at the lower site, six feet on the same plan; but with one dam and one lock, the available water power will be nine feet fall; therefore, if two dams and two locks could have been constructed for the same cost, the single plan ought to have been preferred. The cost of two, however, would have greatly exceeded the cost of erecting one. For comparison:

Plan of two dams and two locks—

Cost of dam and lock at foot of Grand Rapids	. . .	\$138,825 93
Cost of dam and lock and dam at Hanging Rock	. . .	132,782 60
		<hr/>
		271,608 53
Plan of one dam and one lock.		
Cost of dam and lock near the foot of Grand Rapids	. . .	166,928 55
		<hr/>
Difference	. . . . .	<u>104,679 98</u>

The plan of one dam and lock was adopted, not only on account of the great difference of cost in its favor, but also of its greater utility. The height of the dam will be sufficient to give three and a half feet water over the highest points in the rock bed of the river at Little Rock shoals, without taking into consideration the influence the dam will have in backing the waters that distance, or for the height the water will stand on the comb of the dam; both of which will probably be equal to six inches, and give a depth of water of four feet over the highest rocks.

The lock will be 175 feet long and 38 feet wide in the chamber, and of the same dimensions as those used in the Kentucky rivers, which are now being improved. The lock is of sufficient capacity, with a rise of two and a half feet in the river, to pass boats of 200 tons burden—the size which includes the most numerous class which navigate the Ohio—and at all times to pass boats drawing three and a half feet water. The gates will be opened with capstans. The lock walls will be 236 feet in length, with piers of crib-work filled with stone and faced with plank, extending 180 feet in length above and below the lock, for protection walls.

The dam will be one thousand feet in length, built with cribs of timber, filled with stone and covered with six inch plank. The site is on the sand-rock bed of the river, and affords a good foundation for the dam. The rock is more firm and compact than that which is found above water in the vicinity. Care has been taken in the selection of the site, to place the dam sufficiently up the falls for the agitation of the water produced in passing the dam to subside on the rock-bed of the river, to prevent deep washing below—the formation of new sand bars to impede the navigation, and to prevent the structure from being weakened and undermined. The dam is thus placed some distance up the falls, and, as a necessary consequence, the rock, to some extent, has to be excavated below the lock. This selection of the site lessens the height the dam has to be built about one and a half feet, and adds greatly to its permanency. This rise on the rock takes place above the point where the water will be discharged for hydraulic purposes, so that the fall secured by the erection of the dam is fully equal to 12 feet; 9 feet of which, according to the usual allowance of mill-wrights for head and fall races, will be available for machinery, with a supply of water greater than can be used for many years to come—sufficient at least to propel 300 run of 4½ feet mill-stones at seasons of the lowest stages of water, and will not be impeded by floods more than six weeks in a year.

The dam will have some slight influence in backing the waters of the river in medium floods, but this influence will be small. In higher stages of floods in which the water rises on the weir or comb of a dam to something like one-fifth part of its natural height, this influence of backing the water is altogether lost, so that a dam has no effect in increasing the rise of freshets after they swell to a certain height. In such cases an increase of velocity at the place the dam is situated is all the difference which can be perceived. The effect on smaller rises of a river must be very slight; for the water in the pool of a dam of miles in extent, in small floods, moves with a current that is scarcely perceptible, and the difference, consequently, of the elevation between the terminations of the pool must be small indeed.

The banks of the river are generally 19 or 20 feet above its bed; and at the height of ordinary floods, but with the exception of three places in the distance of 11 miles above the mouth of White river, in the highest rises of water, the whole valley bordering the Wabash is overflowed for miles in extent. The valley is very level and uniform in its surface, of a tough clayey soil which affords a tolerable guarantee against cut-offs, and the river from forming new channels.

From the lock and abutments on each side of the river, guard-banks can be cheaply constructed to high ground, which never overflows—a fortunate circumstance in the location which could not be found at any other place within many miles. Almost immediately above the site of the lock on the eastern bank of the river, a point of land, 20 feet above the highest floods, projects into the stream, and forms a harbor where boats may land safely without danger of being drawn over the dam.

This projection of high ground is not so abrupt as to make it difficult to pass, but at the same time it influences the current from the point to the bend of the river on the opposite side, and shields thereby the lock from drift and ice.

The bed of the Wabash for some distance—several miles above the Little Rock rapids—is deep and well adapted to become the reservoir of the sand which must, in the nature of things, be deposited at the head of the pool. Few places on the Wabash could be found so well adapted for the location of similar works, in which safety, convenience, and permanence are so well secured.

The lock-walls are designed to be built of the most durable materials, and in the best manner, as well as the abutments and dam. The greatest amount of trade on the Wabash obviously points to the necessity of doing, in the best manner, whatever is done, so that the work when put up will need little or no repairs, or be of doubtful utility when completed. The plan is very similar to those used in Kentucky on their public works. Care will be taken to have the walls and gates of such dimensions that they will be able to resist the pressure against them; and in the height of the gates, that they shall not exceed the limits in ordinary use for large locks, so that nothing shall be left to conjecture, or the hazard of an experiment.

The difficulty of procuring stone of a good quality, the quantity of materials to be collected at one point, the uncertainty of a proper stage of water for their transportation, and the necessity of having *all the materials* ready and prepared on the ground before a commencement of any part of the structures in the water can be made, induced the recommendation of letting out the delivery of the stone for the lock and abutment. This letting, for the materials, took place on the 22d instant, and contracts taken by two responsible companies for the delivery of 7,000 cubic yards of stone by the 1st of June next, at fair prices for the States. The contractors have already engaged with spirit upon the business of their contracts, and with an activity which promises well for their performance. The prices at which these contracts have been taken would seem to insure the completion of the whole work within the estimates made for its cost.

Thus far, building stone of a good quality has not been found nearer than Portersville, 77 miles by water, above the confluence of White river. There the quarries are fine for the massive work for which the materials

are required; none of a suitable quality have been found nearer to the site of the works, although diligent and laborious search has been made for that purpose.

The cost of the dam and lock is estimated at \$166,928 55. The whole is carefully estimated, and put at such prices as is confidently believed will insure the completion of the work in the most substantial manner, without exceeding the estimates a single dollar.

It is expected that, according to contract, the stone will be delivered by the 1st of June next, and that the main contracts for building the lock and the dam, and abutments, may be let by the 16th of that month; so that the work may be completed by the first of November, 1839.

Ample provision has been made in the estimates for the use of the water-power, in the construction of culverts and canals for the conveyance and discharge of the waters.

So great a power for hydraulic purposes, created in the heart of an extensive wheat growing country, and adjacent to the beds of iron ore abounding in the valley of White river, cannot fail to insure to the States large profits. Its situation in a district of country where water privileges are extremely limited, will enhance its value, and being so great, (and within twelve hours' voyage of the Ohio) will give it such claims to the attention of the public as cannot, in the nature of things, fail to point it out as extremely well situated for any kind of manufacture in which water-power is essential, and induce it to be extensively improved.

In regard to the profits to be derived from the construction of the work, it will be sufficient to remark that, when completed, it will probably stand on more favorable ground, in relation to the revenues to be derived from it, than any other in either of the States. So soon as it shall be completed, a very moderate rate of tolls collected on the great trade of the Wabash will render it profitable in the matter of revenue.

But a very short time can elapse before the rents from the water-power alone will pay the interest on the cost of construction, and keep up the necessary repairs and attendance. Leases for water-power in Indiana rent for \$150 per annum for privilege for propelling one run of four and one half feet mill-stones, and are readily sought for at these prices.

The eligibility of this water-power for the manufacture of iron and nails, of paper, cotton, lumber, and flour, cannot fail of making it in a short time the source of large revenue to the States. The benefits of these works to the country can hardly be appreciated. Great confidence is felt that to the present navigable portion of the year on the Wabash, it will add at least three months to that time, for the upper part of it; and that when the obstacles to the navigation of this section of the river shall be removed, there will be more inducements for the business of steam-boats in the summer season; and that but a very short time in each year will be found, in which light draft boats, suited to the commerce, will not make their regular trips from the upper country to its mouth. Nor will the benefits cease with the extension of the navigation of the river, and the rents and tolls which will be received—the introduction of property, the investment of capital to a great amount in manufactures, will swell the revenues of the States, and add greatly to the aggregate of their wealth, and to the prosperity and convenience of their people.

The disbursements made in locating the work, examinations for stone, purchase of instruments, tools, &c., is \$1,464 68; the one-half of which, or the sum of \$732 34, was paid out of the money furnished by each Commissioner of the respective States, as per account, with vouchers rendered with the plans and estimates in detail; which are respectfully submitted.

A. BURR,
Principal Engineer Wabash river.

Report of Edward Smith, Principal Engineer.

RAILROAD OFFICE,
Mount Carmel, March 7, 1838.

To Gen. M. K. ALEXANDER,
Commissioner of the Board of Public Works.

SIR: In obedience to your instructions, so much of the eastern division of the Alton and Mount Carmel railroad as extends from Mount Carmel to Albion, has been definitely located, and prepared for contract, and I now have the honor to report the following results in relation thereto.

After the receipt of the order of the Board of Public Works, directing the above named portion of this road to be put under contract, accompanied by your instructions to have it ready for letting by the eight of March ensuing, the locating party, which at that time were engaged in preparing the western division of the same road for contract, were removed to Mount Carmel. This party was under the charge of Mr. Terril, and with the exception of Mr. Scheel, who remained at the western office, and whose place was supplied by Mr. Seymour, have located the work on this division. It required some two weeks after their arrival at Mount Carmel to complete the estimates and drawings of the western end of the line, before commencing field operations on this end. These unavoidable causes of delay postponed the commencement of the work here until in the month of January.

The *experimental* lines on the eastern division of Alton and Mount Carmel railroad were made in May and June last, under the then existing order of the Board of Public Works restricting the grades to 30 feet ascent and descent in the mile, with the exception of that portion of the line which crosses the Albion ridge, which, by special instruction, was extended to 40 feet. These preliminary surveys, therefore, were of little aid in effecting the recent location which has been made, with a view of benefiting by the recent order of the Board, in reference to extending the grades at the option of the Commissioners in charge of each respective work. The present location occupies a route which was impracticable, within any reasonable cost, at a grade of 30 feet to the mile, and hence, entire new surveys and examinations were instituted on a considerable portion of the route.

These circumstances, combined with the extreme inclemency of the weather during the month of February, have operated to retard the progress of the work beyond what was anticipated by me when I engaged to have the work ready for contract by the 8th of March. I however have the pleasure to state that, notwithstanding the difficulties and privations which the party necessarily encountered in their field operations, by an assiduity and praise-worthy attention to their duties, all the necessary examinations have been made by them to enable me to present you at this time what I deem to be the most judicious definite location,

on almost the whole line of work, together with a minute estimate of the probable amount and value of the work on each respective section into which the line has been divided. There are two or three points on the route, at which are presented difficulties which require some further examination, to enable me to decide definitely on the precise location to recommend to you; but the plans and profiles of the line at those points indicate the vicinity and character of the work sufficiently explicit to enable contractors to bid understandingly for the execution of it.

Without anticipating further, I will proceed with the description of the line of work, and of the country over which it passes.

The location commences in Mount Carmel, at the bank of the Great Wabash river, on the town commons, and in a line with the centre of Mulberry street; and the ordinary high water-mark of the river is assumed as the base of the vertical survey. From the point of commencement, the line is carried over the commons to the intersection of Front street, at the foot of the bluff upon which the town is situated, and from thence up the centre of Mulberry street. This street occupies a ravine which presents a very favorable and cheap location to ascend from the river bottom to the table land. Near the intersection of Fifth street, the line attains the lowest depression in the hill, at an elevation of 48.4 feet above the base, 3,800 feet from the river bank. Here a curve of ——— feet radius is resorted to, in order to throw the line into the centre of Sixth street, which is attained near the intersection of Market street, and is pursued to the western limits of Sixth street. By this arrangement, the most economical location is adopted, and at the same time the injury done to private property is inconsiderable in amount. The corporation having granted the right of way, for the railroad, through the commons, streets, and alleys of the town, and the resident proprietors having generally acted with the same liberality, the location through the town plat is effected in a manner highly satisfactory for the interests of the State.

After leaving the western boundary of the town, the line is curved gently to the west, and runs, on or near the line of sections, to the crossing of Great-house creek, at the distance of about two miles from the river bank. At the distance of three miles and 24 chains, the summit of the dividing ridge between Great-house and Coffee creeks is attained, at an elevation of 85.6 feet. This ridge forms one of the principal obstructions on the line; and which, with two others of the same description, will render it necessary for the Commissioners at the letting to decide a question of expediency and utility between a sinuous and lengthened line of road, on a low grade, and a direct and straight line, on grades, at these three points, exceeding fifty feet to the mile. By the present location, this ridge is overcome by straight planes; the grade of the plane on the eastern slope being 53 feet, and the first half from the summit of the western plane being on a grade of 34 feet, and the other half, of 53 feet to the mile. The length of the eastern plane is 6,800 feet, and that of the western, 4,900 feet. In order however to effect this design, a cut of 28 feet in depth on the extreme summit of the ridge, and averaging 13.36 feet in depth, for a distance of 1,800 feet, has to be encountered. It is supposed that rock may be met with in this cut, but the shortness of the time allowed for preparing the work for contract, and my indispensable engagements in other parts of the district during a part of the winter, have prevented me from instituting examinations, which otherwise would have been made in reference to the matter, both at this and the Albion ridge, to be described in a subsequent part of this report. If rock should occur at any considerable elevation in the cuts, (which fact will be fully determined before the work shall be commenced,) it is supposed that the cost of the excavation will not be materially influenced thereby, as the aggregate amount of material

to be removed will be diminished, and also, the rock may be of value to the State for masonry on the line.

After passing this ridge, the line assumes the valley of Coffee creek, and passes over a gently undulating country, until it reaches the dividing ridge between the waters of Coffee creek and Bon Pas river, on Mr. Robert Rigg's plantation. On leaving the foot of the ridge between Great-house and Coffee creeks, near Mr. Samuel Rigg's dwelling house, the line is necessarily subjected to a slight curve, and thrown south of a direct line to Albion, in order to avoid a very elevated section of the ridge, and assume a low gap near Rigg's house. The elevation is overcome by a plane of 2,200 feet in length, and on a grade of 74.4 feet to the mile on the easterly slope, and on the westerly slope by a plane 2,400 feet long, and grade of 49.10 feet to the mile. The depth of the cut on the extreme summit is 13.64 feet, and averages 6.40 in depth for a distance of 1,700 feet. It is worthy of particular remark, that the grades on the eastern side of the ridge can be materially diminished and brought within moderate limits, by resorting to a curved line, conforming to the southern escarpment of the hill on the south of Mr. Rigg's dwelling house, by which means the plane can be commenced at a much greater distance from the summit. Immediately after passing this ridge, the line assumes the wide and level valley of the Bon Pas river, and passes for the most part through or in the immediate vicinity of a finely timbered country. At the distance of 12 miles and 55 chains from the Wabash, the Bon Pas is intersected, and passed at a favorable point for the construction of the bridge, and on a quarter section of land owned by the State. The country west of the river still continues comparatively level, but is more open and interspersed with farms and prairies. This description of country continues to within about one and one-quarter mile of the summit of the Albion ridge, or about sixteen miles from Mount Carmel. Here commences one of the principal obstructions in the vertical line of the road which occur on the whole line between the Wabash and Mississippi rivers.

It is not so much to the height of the ridge that the obstruction is to be attributed, as to its relative elevation to the level country which approaches it within so short a distance of its summit. It might be supposed, on cursory reflection, that as the line receded from the Wabash river in a westerly direction, the *general* level of the country would become more elevated; yet the surveys have developed the fact, that the bed of the Bon Pas, at the point of crossing, is about as low as that of the Wabash at Mount Carmel; and that the country near the foot of the Albion ridge is very little elevated above high water mark of the latter stream at the above named point. This fact however is easily explained, when it is considered that the line of survey pursues the general direction of the valley of the Wabash, crossing its small tributaries at right angles, and consequently partakes of the general inclination.

The elevation of the lowest depression in the Albion ridge, by which the line can be carried through any part of the town plat, ranges from 126 to 128 feet above the base line; and from the nature of the country, any plane which may be assumed to overcome 100 feet of this elevation, and carry the line through the town, must be commenced within a fraction over one mile from the summit. If the plane should be straight, the grade cannot be much under 90 feet to the mile, without encountering work of a very expensive character; and in proportion as the grade is reduced, the line must either be curved and the distance prolonged, or the cuttings and embankments increased. In the latter case, and perhaps in both, the cost of the work will be materially augmented.

The plan and profiles herewith submitted exhibit an assumed line over the ridge, and onward to the end of the 18th section; more for the purpose of indicating the character and amount of work on these sections than of determining the precise location of the line; and a notice to this effect will be appended to the description

of the work exhibited at the lettings. Any location that may be deemed more judicious, on a critical revision of the line, will not change materially, if any, the character, or perhaps the amount of work, as shown by the present description of it, and therefore proposals can be received for its execution, without impropriety in any point of view. The examinations which have been made on this portion of the line, both at the time of executing the preliminary surveys, and during the present winter, have been elaborate and extensive; and no doubts are entertained of the practicability of overcoming this obstruction, with a line as favorable in regard to cost and effective usefulness as that now presented; and strong hopes are indulged that the whole can be materially improved.

I used my utmost endeavors to despatch the business at the lettings on the western division of the road, and return to this work as speedily as possible, in order to effect a definite location of the work on the 17th and 18th sections, which would be satisfactory to my own mind, previous to the lettings. On my arrival, I found it necessary to devote my whole time in assisting to make up the results of the field operations, which had already been had, in order to be ready for the lettings; and was therefore precluded from carrying this design into effect. I propose, however, to attend to this matter specially, as soon as your advice and instructions in relation to it can be obtained, and without any delay to the contractors, should the section be let.

In addition to what has already been said in reference to the grades on the line, it may be proper to remark that steep planes occur but at four points, and in every instance, their greater inclination and length occur on the eastern slopes, and in the direction in which a large preponderance of the heavy transportation may reasonably be expected; that the planes are generally on straight lines; and that they are susceptible of improvement by reduction, whenever the amount of trade upon the road or other circumstances may render such a change economical or judicious.

It should also be borne in mind, that there is every probability of this work, at no distant day, forming a link in a continuous line between Louisville, on the Ohio, and two great and rival commercial emporiums on the Mississippi river; and that it will come into direct competition, for the travel and light transportation with the steamboat navigation between those important points, in the great valley. In view of these facts, there can be no question, but that the interests of the State would be as well consulted in projecting this design, to provide for the most speedy and advantageous conveyance of passengers, as by adopting the road exclusively to heavy transportation. And the one object can be secured, without materially affecting the other, by avoiding as far as practicable all increase of distance and curvatures on the line.

Aware of your opinion on this subject, I deem it supererogatory, on my part, to urge the propriety of adopting a straight and direct location at the expense of a few rather elevated grades. The recent experiments on the use of steam engines on rail-ways tend fully to develop the fact that these valuable machines possess a much greater inherent power and capacity for operating to advantage on inclined roads than was imagined, or at least practicably applied, some years ago; and therefore some of the most important lines of railroads in the United States have recently been projected, by engineers of unquestionable scientific and practical knowledge in their professions, predicated on the use of mechanical motive power, on grades greatly exceeding fifty feet to the

mile. In view then of the discoveries which are almost daily making, in regard to the increased capacity and advantage of steam motive power on roads; and also, of the propriety of applying, to the construction of our public works in Illinois, that rigid economy which prudence and custom dictate in all private improvements, in a new country, there can exist but little danger of falling into error, by avoiding, as far as practicable, all expenditures of doubtful necessity and utility in the construction of our roads.

The accompanying tables of gradients and of curves, exhibit a condensed view of these peculiarities, in the route selected. By reference to these tables, and to the map herewith submitted, it will be perceived that the route of the road between Mount Carmel and Albion is very direct, and for the most part on straight lines. But few curves occur, and with the exception of the one within the town plat of Mount Carmel, they are all on very extended radii.

As the whole drainage of the country is intersected by the line, nearly at right angles, the undulations in the vertical line of the road are consequently frequent; but with the exception of the points above alluded to in detail, these fluctuations in the line are too minute and inconsiderable to affect injuriously the usefulness of the road when in operation.

The mechanical structures on the line are few and inconsiderable; the bridge over the Bon Pas being the most important. From the difficulty at present apprehended in procuring suitable stone, near the route, for bridge abutments, it is proposed to adopt the simplest and cheapest plans, in all cases, for these structures, and to support them with wooden trestles. As timber of the first quality for these purposes abounds in the immediate vicinity of the respective works, a judicious economy seems to require the use of it, in the absence of suitable rock, until future examinations shall have developed the existence of better materials; when its transportation, even from a considerable distance, can be effected on the railway at a small expense to the State. The same course is proposed to be adopted in relation to the smaller water ways on the line, where the same difficulty is apprehended in regard to procuring rock; with the understanding, however, that if the excavations in the line should discover suitable rock for their construction, it will be applied in lieu of the timber drains.

The facilities for procuring materials on the route for the construction of the works, with the exception of building rock, are highly favorable. The country through which the road passes, and especially the valley of Bon Pas, is for the most part well timbered; and the Wabash, White river and Patoka, all uniting immediately at the debouchment of the road on the Wabash present facilities for procuring supplies of timber for the construction of the railway, which perhaps are not surpassed, if equalled, at any other point in the State.

The total length of the present located line is eighteen miles; which has been sub-divided into eighteen sections, of nearly equal extent. A tabular statement or synopsis of the probable amount and description of the different items of work on each respective section, together with minute estimates of the probable cost of the work, is herewith submitted. The subjoined estimates embrace, also, the probable cost of the

timber, and workmanship of the superstructure of the railway, and of completing the whole work for the reception of the cars.

Land for the river depot at Mount Carmel can be obtained on the town commons, without any present cost to the State. Liberal offers have also been made by citizens of Albion for furnishing land for a depot at that place; and the feelings manifested by the community, generally, on the route of the work, fully warrant the belief that little or no difficulty will arise in regard to obtaining the right of way for the road as well as sites for depots.

The accompanying drawings and specifications illustrative of the survey, location, and construction of the road, together with this report, are all most respectfully submitted by

Your obedient servant,

EDWARD SMITH,

Principal Engineer of Southern District.

An estimate of the probable cost of work proposed to be executed in the construction of the first eighteen sections of the eastern division of the Alton and Mount Carmel railroad, extending from Mount Carmel to about three-fourths of a mile southwest of Albion.

SECTION No. 1, 6,500 feet in length, commencing on the bank of the Wabash river, in Mount Carmel, passing up Mulberry street, curves into Sixth street, and extends to station 65, being at the west end of the town plat of Mount Carmel.

6,667 cubic yards of excavation, at 14 cents per yard	-	\$933	38
7,758 cubic yards of embankment, at 18 cents per yard		1,396	44
2 brick drains, 30 perches, at \$5 per perch	-	150	00
9 street crossings, at \$25	- - - -	225	00
86 rods fencing, at 50 cents per rod	- - - -	43	00
		<hr/>	
		\$2,747	82

SECTION No. 2, 4,500 feet in length, commencing at the west end of the town plat of Mount Carmel, and extending to the west bank of Greathouse creek.

5.50 acres of clearing, at \$25	- - - -	137	50
1.00 acre of grubbing, at \$125	- - - -	125	00
50 cubic yards of excavation, at 16 cents	- - - -	8	00
11,047 cubic yards of embankment, at 17 cents	- - - -	1,877	99
200 lineal ft. bridging over Greathouse creek, at \$3 per ft.		600	00
1 brick drain, 19 perches, at \$5 per perch	- - - -	95	00
1 wood drain, 400 feet of timber measure, at 8 cents		32	00
1 road crossing, at \$25	- - - -	25	00
98 rods fencing, at 50 cents	- - - -	49	00
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		\$2,949	49

SECTION No. 3, 6,400 feet in length, commences at Greathouse creek, and extends to the summit at Key's Ridge.

8.75 acres of clearing, at \$30	-	-	-	\$262 50
32,156 cubic yards of excavation, at 16 cents	-	-	-	5,144 96
1,000 cubic yards of sand stone, at 80 cents	-	-	-	800 00
11,771 cubic yards embankment, at 16 cents	-	-	-	1,883 36
1 brick drain, 50 perches, at \$5 25 per perch	-	-	-	262 50
376 rods of fencing	-	-	-	150 00
2 road crossings, at \$20	-	-	-	40 00
				<hr/>
				8,543 32
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SECTION No. 4, 5,400 feet in length, commences at the summit, (Key's Ridge,) and extends to near Samuel Rigg's plantation.

9.80 acres clearing, at \$25	-	-	-	245 00
1.00 acre grubbing, at \$125	-	-	-	125 00
15,124 cubic yards excavation, at 16 cents	-	-	-	2,419 84
1,000 cubic yards sand-stone, at 80 cents	-	-	-	800 00
9,239 cubic yards embankment, at 16 cents	-	-	-	1,478 24
1 brick drain, 50 perches, at \$5 25	-	-	-	262 50
1 wood drain, 810 feet of timber, at 9 cents per foot	-	-	-	72 90
1 public road crossing	-	-	-	30 00
230 rods fencing, at 50 cents	-	-	-	115 00
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				\$5,548 48
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SECTION No. 5, 4,600 feet in length, commences near Samuel Rigg's, and extends to near the Coffee creek.

7.80 acres clearing, at \$25 per acre	-	-	-	\$195 00
1.10 acres grubbing, at \$125 per acre	-	-	-	137 50
8,156 cubic yards excavation, at 15 cents per yard	-	-	-	1,223 40
5,208 cubic yards embankment, at 16 cents per yard	-	-	-	833 28
Bridging 200 feet over slough, at \$2 50	-	-	-	500 00
1 stone drain, 18 perches, at \$3 50 per perch	-	-	-	63 00
1 drain of wood, 510 feet of timber, at 9 cents	-	-	-	45 90
Public road crossing	-	-	-	30 00
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				3,028 08
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SECTION No. 6, 4,300 feet in length, commences on the east side of Coffee creek, (in the Coffee flats) and extends to a short distance beyond Christian Urnot's plantation.

8.25 acres clearing, at \$30 per acre	-	-	-	\$247 50
.75 acre grubbing, at 125	-	-	-	93 75
.30 acre prairie sod, at 20 dollars	-	-	-	6 00
1,390 cubic yards excavation, at 16 cents per yard	-	-	-	222 40
4,544 cubic yards embankment, at 18 cents per yard	-	-	-	817 92
Bridge 200 feet, over Coffee creek, at \$2 50	-	-	-	500 00
1 wooden drain, 420 feet of timber, at 8 cents per foot	-	-	-	33 60
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				1,921 17
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SECTION No. 7, 5,300 feet in length commences near Christian Urnot's, and extends to the edge of a small prairie near George Rice's house.

11.50 acres clearing, at \$25 per acre	-	-	-	\$287 50
1.10 acres grubbing, at \$120 per acre	-	-	-	132 00
.20 acre prairie sod, at \$20 per acre	-	-	-	4 00
1,392 cubic yards excavation, at 14 cents per yard	-	-	-	194 88
6,373 cubic yards embankment, at 17 cents per yard	-	-	-	1,083 41
Bridge, 40 feet, at \$2 50	-	-	-	100 00
1 wooden drain, 300 feet of timber, at 8 cents per foot	-	-	-	24 00
				<u>1,825 79</u>

SECTION No. 8, 6,000 feet in length, commences near George Rice's house, and extends to a summit northwest of Robert Riggs'.

2.30 acres clearing, at \$25 per acre	-	-	-	\$57 50
.20 acre grubbing, at \$130 per acre	-	-	-	39 00
5,225 cubic yards of excavation, at 14 cents per yard	-	-	-	731 50
14,215 cubic yards of embankment, at 17 cents per yard	-	-	-	2,416 55
2 wooden drains, 1,200 feet of timber, at 9 cents	-	-	-	108 00
173 rods of fence, at 50 cents (on Rice's)	-	-	-	86 50
206 rods of fence, at 50 cents (on Riggs')	-	-	-	103 00
				<u>3,542 05</u>

SECTION No. 9, 4,600 feet in length, commences at the summit near Robert Riggs', and continues down to near the bottom land on Bon Pas flats.

10.50 acres clearing, at \$25 per acre	-	-	-	\$262 50
.70 acre grubbing, at \$125 per acre	-	-	-	87 50
7,198 cubic yards of excavation, at 15 cents per yard	-	-	-	1,079 70
12,811 cubic yards of embankment, at 16 cents per yard	-	-	-	2,049 76
1 wooden drain, 690 feet of timber, at 8 cents	-	-	-	55 20
				<u>3,534 66</u>

SECTION No. 10, 5,400 feet long, commences near the Bon Pas flats, and continues to near the White-oak ridge in the direction of the Bon Pas river.

12.50 acres of clearing, at \$30 per acre	-	-	-	375 00
.80 acres of grubbing, at 125 dollars per acre	-	-	-	100 00
4,710 cubic yards of excavation, at 14 cents per yard	-	-	-	659 40
8,327 cubic yards of embankment, at 16 cents per yard	-	-	-	1,332 32
2 wooden drains, 1,100 feet of timber, at 8 cents per ft.	-	-	-	88 00
				<u>2,554 72</u>

SECTION No. 11, 5,200 feet in length, continues on the bottom land in the direction of the Bon Pas river.

12.50 acres of clearing, at 25 dollars per acre	-	-	\$312 50
.60 acre of grubbing, at 150 dollars per acre	-	-	90 00
2,949 cubic yards of excavation, at 14 cents per yard	-	-	412 86
4,713 cubic yards of embankment, at 17 cents per yard	-	-	801 21
Bridging over bottom lands 50 ft., at 2 dolls. per ft.			100 00
2 wooden drains, 910 feet of timber, at 7 cents per foot.			63 70
			<u>1,780 27</u>

SECTION No. 12, 5,300 feet in length, continues in the direction of the Bon Pas, and crosses a wet prairie.

5.75 acres clearing, at 30 dollars per acre	-	-	\$172 50
.30 acre grubbing, at 130 dollars per acre	-	-	39 00
1.00 acre prairie sod, at 20 dollars per acre	-	-	20 00
3,564 cubic yards of embankment, at 16 cents per yard	-	-	570 24
Bridge, 100 feet, over Crackle's creek, at \$2 25 cents			225 00
Road crossing	-	-	20 00
60 rods of fence, at 50 cents per rod	-	-	30 00
			<u>1,076 74</u>

SECTION No. 13, 5,300 feet in length, commences on the east side of the Bon Pas river and crosses the same, passing through the margin of prairie and timber.

9.20 acres of clearing, at 30 dollars per acre	-	-	276 00
1.30 acres grubbing, at 130 dollars per acre	-	-	196 00
1,358 cubic yards of excavation, at 15 cents per yard	-	-	203 70
993 cubic yards of embankment, at 15 cents per yard	-	-	148 95
Bridge, 120 feet, in three spans, at 8 dollars	-	-	960 00
Bridge, 140 feet, double track, truss work, (see drawing) over Bon Pas, at 5 dollars	-	-	700 00
1 wooden drain, 510 feet of timber, at 7 cents	-	-	35 70
2 road crossings, at 25 dollars	-	-	50 00
48 rods of fencing, at 50 cents per rod	-	-	24 00
			<u>2,567 35</u>

SECTION 14, 5,300 feet in length, commences half a mile west of Bon Pas river, and continues to the bank of Stillhouse creek, passes through some cleared land owned by Hall, Buckner, and Hassel.

2.50 acres of clearing, at 25 dollars per acre	-	-	62 50
.30 acres of grubbing, at 100 dollars per acre	-	-	30 00
7,697 cubic yards of embankment, at 18 cents per yard	-	-	1,385 46
2 stone drains, 20 perches, at 3 dollars 50 cts. per perch			70 00
1 road crossing	-	-	30 00
231 rods of fencing, at 60 cents	-	-	138 60
			<u>1,716,56</u>

SECTION No. 15, 5,700 feet in length, commences in the east and south bank of Still-house creek, crosses the same in four different places in the direction of Albion.

12.20 acres of clearing, at 25 dollars per acre	-	-	\$305 00
2.20 acres of grubbing, at 130 dollars per acre	-	-	286 00
.50 acre of prairie sod, at 20 dollars per acre	-	-	10 00
1,292 cubic yards of excavation, at 16 cents per yard	-	-	206 72
2,639 cubic yards of embankment, at 18 cents per yard	-	-	475 02
Bridging 300 feet in different locations, at \$2 25	-	-	675 00
1 stone drain 16 perches, at \$3 50 per perch	-	-	56 00
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			2,013 74
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SECTION No. 16, 5,300 feet in length, commences in edge of prairie near where the Shawneetown and Lawrenceville road crosses the same—passes through Wm. Bushet's orchard, and extends to the broken ground near the Albion summit.

1.80 acres of clearing, at 25 dollars per acre	-	-	45 00
.30 acre of grubbing, at 120 dollars per acre	-	-	36 00
1 acre prairie sod	-	-	20 00
3,839 cubic yards of excavation, at 15 cents per yard	-	-	575 85
6,089 cubic yards of embankment, at 16 cents per yard	-	-	974 24
3 stone drains, 30 perches, at \$3 50 per perch	-	-	105 00
2 public road crossings, at 30 dollars	-	-	60 00
1 private road crossing	-	-	20 00
98 rods of fencing, at 75 cents	-	-	73 50
			<hr/>
			1,909 59
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SECTION No. 17, 6,200 feet in length, commences in the broken ground east of Albion summit, passes the same and continues to Albion.

9.20 acres of clearing, at 30 dollars per acre	-	-	276 00
.30 acre of grubbing, at \$125	-	-	37 50
21,069 cubic yards of excavation, at 16 cents per yard	-	-	3,371 04
1,000 cubic yards sand stone, at 80 cents	-	-	800 00
37,498 cubic yards of embankment, at 16 cents per yard	-	-	5,999 68
Bridge 40 feet over branch of Still-house creek, at \$2 50	-	-	100 00
2 stone drains, 38 perches, \$3 50 per perch	-	-	133 00
2 road crossings, at 30 dollars	-	-	60 00
148 rods of fence, at 75 cents	-	-	111 00
			<hr/>
			10,888 22
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SECTION No. 18, 4,100 feet in length, commences in the town plat of Albion and extends in a southwesterly direction about three-fourths of a mile, country broken by small ridges.

6.90 acres clearing, at 25 dollars	-	-	-	\$172 50
.50 acre grubbing, at 125 dollars	-	-	-	62 50
6,889 cubic yards of excavation, at 15 cents per yard	-	-	-	1,033 35
6,172 cubic yards of embankment, at 15 cents per yard	-	-	-	925 80
6 stone drains, 59 perches, at \$3 50	-	-	-	206 50
5 street and road crossings, at 30 dollars	-	-	-	150 00
148 rods of fence, at 60 cents	-	-	-	88 80
				<hr/>
				2,639 45
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RECAPITULATION OF THE COST OF ROAD-BED AND BRIDGING.

Section number 1	-	-	-	-	\$2,747 82
Section number 2	-	-	-	-	2,949 49
Section number 3	-	-	-	-	8,543 32
Section number 4	-	-	-	-	5,548 48
Section number 5	-	-	-	-	3,028 08
Section number 6	-	-	-	-	1,921 17
Section number 7	-	-	-	-	1,825 79
Section number 8	-	-	-	-	3,542 05
Section number 9	-	-	-	-	3,534 66
Section number 10	-	-	-	-	2,554 72
Section number 11	-	-	-	-	1,780 27
Section number 12	-	-	-	-	1,076 74
Section number 13	-	-	-	-	2,567 35
Section number 14	-	-	-	-	1,716 56
Section number 15	-	-	-	-	2,013 74
Section number 16	-	-	-	-	1,909 59
Section number 17	-	-	-	-	10,888 22
Section number 18	-	-	-	-	2,639 45
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Total	-	-	-	-	\$60,788 50
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Estimate of the probable cost of the superstructure of railway for one mile of single track.

1.	11,500 lineal feet foundation sills, at $\frac{4}{100}$ cents	\$460 00	
2.	1,510 cross sills - - - - - 25	377 50	
3.	30,800 feet board measure rails \$18 per M.	554 40	
4.	3,020 wedges - - - - - 3 cents	90 60	
	Value of timber delivered on line,		\$1,482 50
5.	Mechanical work per mile - - - - -	900 00	
	Horse path - - - - -	200 00	
			1,100 00
	Iron, spikes, &c.		
	22 $\frac{1}{2}$ tons of iron delivered, \$90 per ton -	2,002 50	
	Spikes, lap-plates, &c. - - - - -	150 00	
			2,152 50
	Total cost of single track per mile - - - - -		4,735 00
	Add for turn-outs, side-tracks, crossings, &c, per mile, ten per cent. - - - - -		473 50
	Total amount per mile - - - - -		<u>\$5,208 50</u>

Specifications of the manner of executing the work, &c., on the eastern division of the Alton and Mt. Carmel railroad, extending from Mt. Carmel to Albion, which work is advertised to be let on the 8th day of March, 1838, at the Railroad office in Mt. Carmel.

CLEARING AND GRUBBING.

Preparatory to commencing the graduation of the road, a way-space, extending fifty feet on each side of the central line, will be cleared off and grubbed in the following manner, viz: In slight excavation, and also where the embankment shall be less than two feet in height, the space to be occupied by them will be neatly grubbed of all trees, saplings, bushes, stumps, and roots; and where the embankment shall be two feet high and upwards, such space will be neatly cleared by cutting off, completely even with the natural surface of the earth, all trees, saplings, bushes, stumps, and other vegetable growth thereon; and, in both cases, the whole of such space to be occupied by the road-way will be neatly cleared off, and all the vegetable and perishable substances removed before commencing the embankment thereon. The residue of the space of 100 feet wide, not occupied by the road-way, will be cleared off by felling all trees, saplings, and bushes standing thereon; and the trunks and large limbs of all timber to be trimmed and left on the ground for

the use of the State; and rolled, piled, or otherwise disposed of on the said clearing, so as to admit of convenient passage of wagons along both sides of the railroad; and in such manner, also, as not to obstruct any travelled road or bridge, or to interfere with any side ditch or drain. The brush, trash, and logs from such clearing are to be burnt by the contractor. Where the line passes through natural and newly cultivated prairie, the prairie sod will be excavated and removed from the space to be occupied by embankments, in all cases where the height of embankment is less than two feet.

EXCAVATIONS AND EMBANKMENTS.

The spaces to be occupied by the road-way having been first cleared and grubbed, in the manner specified under the head of clearing and grubbing, the graduation will be made according to the plans, profiles and cross sections thereof, exhibited at the lettings, subject to all changes and alterations which may be deemed advisable by the acting Commissioner, or principal engineer on the work directing its progress.

The embankments will be constructed of pure earth, sand, gravel, or rock, and no vegetable or perishable substance will be admitted into them. The embankments contiguous to excavations will be formed of the materials taken from such excavations; and if the distance of conveying such materials does not exceed 200 feet, the embankment so formed will be considered as paid for in the excavation. But in all cases where embankments are formed with materials taken from side ditches, or other points within the line of road-way; and where the materials from excavations within the line of road-way are necessarily removed a greater distance than 200 feet, the embankment will be paid for as such. Under the term, "embankment," is included the filling in of all bridges and other abutments, and covering of drains; which jobs shall be done at such specified times and in such manner as the engineer or superintendent on the work shall direct. Side ditches and side drains will be cut at such points and positions, and of such slopes and dimensions, as shall be directed by the engineer in charge of the work; and together with the excavations of abutments and drain-pits, will be paid for as excavation at the contract price, excepting where the materials from such ditches, drains, and pits, are needed to form embankments within 100 feet from the place of excavating the same; in which case this work will be paid in embankment only.

Great care will be required of the contractors to make excavations coincide as near as may be with the line of grade, and in no case to fall below it; and the embankments will be constructed of such extra height above the line of grade as the engineer may deem necessary, from the nature of the material, to allow for shrinkage; and such additional amount of embankment will be paid for at the contract price.

Any deficiency of materials for embankments, not supplied from the necessary side ditches and drains, and contiguous excavations in the line of road-way, will be procured from such convenient point in the vicinity of the line as the acting Commissioner or engineer may direct. And the contractor will be required to use special care in removing the same, to disfigure or injure, as little as may be practicable, the lot, field, or piece

of ground from which such materials are removed. Any redundancy of materials from excavation not required for embankment within 200 feet from the point of excavating it, or not otherwise used by the contractors for embankment beyond 200 feet, shall be disposed of in such manner as the engineer may direct for the widening of embankments within 200 feet of the point of excavating such materials, or placing it as a spoil within 100 feet of the line of road-way, in such form and position as will be of as little injury to the work, or to private property, as may be practicable; but no extra pay will be allowed for thus disposing of such material. Any rock suitable for building, which may be taken from the excavation, and not needed on the section for masonry, will be considered as property of the State.

MASONRY.

The abutments and piers of bridges, and the culverts and drains, will be built of stone, where procurable within a reasonable distance of the work; and the bids on this work will be predicated on the stone being procured within one mile. If transported a greater distance than one mile, the expense of such extra transportation to be paid for at the estimate of the principal engineer. The stone used in the work will be of good size, to be approved of by the principal engineer on the work, and will be laid in coursed rubble-work, well bedded, and break-joints with preceding courses. Mortar will be used for the masonry, unless otherwise directed by the principal engineer, and will be made of the best quality of unslacked lime and sharp clean sand, to be combined in such proportions as the engineer or superintendent on the work shall direct. Where suitable stone cannot be procured, well burnt brick will be substituted, if directed and approved of by the principal engineer. The walls will be laid in the most substantial and workmanlike manner, and pointed, and such portions grouted as the engineers or superintendent may direct. No materials will be used on the work until inspected and approved of by the principal engineer, or such other person as he may specially direct to inspect the same.

WOODEN DRAINS.

The drawings of these structures, exhibited at the letting, will indicate the principles which will govern their construction; but they will necessarily vary in length and size with local circumstances. They will be built with sound white-oak, post-oak, or of timber of equal durability, to be approved of by the principal engineer on the work. The proposals for the wooden drains will be made by the foot, (timber measure) of the timber used therein, and the price to include both timber and workmanship.

VIADUCTS, BRIDGES, AND TRUSS-WORK BRIDGES.

All the viaducts, bridges, and truss work will be constructed in conformity to the plans, elevations, and descriptions thereof, exhibited at the

lettings, subject, however, to all changes and alterations therein which the acting Commissioner or principal engineer for the time being may deem advisable to make subsequent to making the contract. All timber and plank to be used in these structures, either for the tressle supports or superstructure, will be of sound white-oak, or timber of equal strength and durability, to be entirely free from decay, crack, wind-shakes, knots, or other defects calculated to impair its strength or durability; and in conformity to a recent order of the Board of Public Works, must pass the inspection of, and be approved by, the principal engineer for the time being, before being used in the work.

All timber designed for the wooden structure on the line must be either sawed or smoothly and neatly counter-hewn, brought to fair angles, and free from wave edges, excepting the mud sills, or other parts of the work embeded in the ground. The mechanical work must be executed in a good substantial and workmanlike manner; the mortices, tenons, shoulders and abutments must be dressed neatly and smoothly, and in such manner as in every case to give full, fair and uniform bearings at all joinings in the work. The tenons, abutments and other joinings of the frames will be primed and put together with white lead ground in oil, and such portions of the bridges as are marked with the letter P, in the drawings thereof, will be primed and painted with two good coats of oil, and white or red lead, at such time after their construction as shall be directed by the principal engineer on the work.

The iron to be used in the viaducts and bridges will, in like manner, be inspected and approved by the principal engineer; and the contractors will be required to oil it, or take other means to protect it from rusting, before being used in the work, and upon using it in the work, to cause such parts of it as are exposed to the weather to be painted immediately.

TIMBER FOR THE SUPERSTRUCTURE OF THE RAILWAY.

1. *Foundation sills and joining blocks*, (requiring 11,500 lineal feet to the mile.)—These sills will be of sound white-oak, burr-oak, post-oak, black walnut, sassafras, locust or catalpa. The stocks will not be less than nine inches diameter at the smallest end, and of any length over fourteen feet. The sills will be flattened by hewing them, on two opposite sides, to a uniform thickness from end to end, having one of the faces fair and smooth; the other may be left in the rough, as it is scored off, but each hewn face shall not be less than six inches wide at any point.

In lieu of the above described foundation sills, sound white-oak plank, two and a half inches thick and seven inches wide, may be used, and proposals will also be received for such plank, requiring 16,500 feet board, or 9,000 feet, timber measure, for each mile of road.

2. *Cross sills*, (requiring 1,510 to the mile.)—The cross sills will be one foot eight inches long, clear of carfs, and not less than ten inches diameter at the smallest end. If split out of large trees, they will be of a size that will square eight inches, and at least six and a half inches of which must be heart-wood. In all cases they will be flattened on one side to a true face from end to end, of not less than seven inches wide at

the narrowest place, and parallel with the upper or opposite side of the sill. These sills will be of white, burr, or post-oak, heart black-walnut, sassafras, locust, and catalpa; or other wood of equal strength and durability which the Commissioner or principal engineer may accept of. Separate and distinct proposals will be received for furnishing catalpa cross sills, to be delivered at the river depot at Mount Carmel, or at any other point or points on the line.

3. *Rails*, (requiring 10,560 lineal feet, or 30,200 feet board measure, or 10,560 feet timber measure, for one mile.)—These rails will be of sound white-oak, burr-oak, post-oak, heart black walnut, heart locust, or such timber of equal durability and strength as the Commissioner or principal engineer may think advisable to accept of. The size of the rails if sawed will be five inches by seven inches, or if hewn, five and a fourth by seven and a fourth, (to allow for counter hewing, or otherwise fitting them into the cross sills.) They must be sawn or hewn to full size, and with true sides and full angles, entirely free from exterior sap, and wave edges, and free from decay, knots, wind-shakes or other defects calculated to impair their strength or durability. They will be in lengths of 14, 17 and a half, 21, 24 and a half, or 28 feet, or either, or all of them, at the option of the contractor. The contractors will be expected to keep the rails in a position to prevent their springing or warping until inspected and received by the engineer.

4. *Keys and wedges*, (requiring 3,020 for each mile of railway.)—These wedges will be made of sound white or post-oak, or heart locust scantling four inches by four and a half inches square. These scantlings will be cut into blocks 14 inches long, and each block slit with a circular saw to a level, in conformity to models furnished the contractor; each block making two bevelled wedges.

5. *Delivery and disposition of the timber*.—Upon all or any portion of the timber being delivered at the point or points contracted for, the principal engineer will inspect or cause the same to be inspected; whereupon, the contractor will proceed forthwith to pile such parts of it as has been adjudged to be according to contract, in such manner and position as the engineer or other inspecting officer shall direct, in order to preserve the same from loss and injury by decay, warping or otherwise.

GENERAL SPECIFICATIONS.

The contractors will be required to furnish all materials at their own expense, which in all cases will be subject to inspection by the principal engineer before being used in the work.

The contractors will not obstruct any highway, travelled road, or bridge, in the vicinity of the work during the progress thereof; and in case when the line of railroad crossing or otherwise interferes with any such highway, road or bridge, the contractor will keep the same open, and in its ordinary repair, until the regular and permanent crossing for the same, over the railroad, shall be completed.

The contractors will be required to execute all the work in a perfect, correct, substantial and workmanlike manner, under the direction of the Commissioners, engineers, and in strict conformity to the stakes, or other marks which shall from time to time be set or made to designate the

ground, plans, slopes, profiles, and elevations of the line, and of the structures thereon; and for that purpose will be expected to take all possible care to preserve and perpetuate such stakes and marks during the progress of the work.

The acting Commissioner reserves to himself and his successors in office, the right and privilege to make any change and alterations in the work and manner of executing the same, which, in the progress thereof, may be deemed advisable. Any increase or diminution in the amount of work, of the same description as named in the contract, which may be caused by such change, will be paid or deducted for at the rate of the contract price.

If any items of new work, not named in the contract, should be required by such change, or if any increase or diminution of the relative value of the work contracted for should be so caused, then in those cases the work will be paid for at the estimate of the principal engineer for the time being, whose decision therein shall be final and conclusive.

Contractors will execute any items of new work occurring on their jobs, which may be deemed necessary by the Commissioner or principal engineer, and which may not be mentioned or contemplated in their contracts, if thereunto requested by the acting Commissioner or principal engineer, and will be paid therefor at the estimate of the principal engineer for the time being.

Where two or more contractors are concerned in a job, and enter into joint contract to execute it, they will be considered a firm in law, and the act of one of the partners, in the transaction of any business in relation to the contract, will be considered as binding on the whole.

All contracts will be required to be executed and fulfilled by and under the immediate personal superintendence of the contractors, and not by sub-contractors. Every description of work and all materials will remain at the risk of the contractors until the work or structures are fully completed and received by the acting Commissioner.

Estimates of the amount and relative value of the work actually done by the contractors on their respective jobs, will be made at stated periods during the progress thereof, not exceeding two months asunder; and not less than sixty-seven, nor more than eighty-five per centum of the amount of the estimate will be paid to the contractors; and the residue will be retained until the final completion of the job, as a security to the State for the faithful execution of the contracts. All payments will be made in notes of the State Bank of Illinois or branches, or of the Bank of Illinois or branches, or in such other funds as the Fund Commissioners of the State of Illinois shall furnish the acting Commissioner for the purpose of making such payments.

EDWARD SMITH,

Principal Engineer, &c.

RAILROAD OFFICE,

Mount Carmel, Illinois, March 8, 1838.

A SYNOPSIS of the probable amount of work on the respective

Sections.		Clearing, Grubbing &c.			Graduation.		
No. of section.	Length in feet.	Acres of clearing, including the clearing of road-way under embankments less than 2 feet.	Acres of grubbing of road-way.	Acres of prairie sod to be removed from the road-way.	Cubic yards of earth excavation.	Cubic yards of rock excavation.	Cubic yards of embankment.
1	6,500	-	-	-	6,667	-	7,758
2	4,500	5.50	1.00	-	50	-	11,047
3	6,400	-	-	-	32,156	Stratified sand-stone rock may be encountered on this section at the summit of the ridge, say 1,000 yards.	11,771
4	6,400	9.80	1.00	-	15,124	Stratified sand-stone rock may occur on this section, say 1,000 yards.	9,239
5	4,600	7.80	1.10	-	8,56	-	5,208
6	4,300	8.25	.75	.30	1,390	-	4,544
7	5,300	11.50	1.10	.20	1,392	-	6,373
8	6,000	2.30	.30	-	5,225	-	14,215
9	4,600	10.50	.76	-	7,198	-	12,811
10	5,400	12.50	.80	-	4,710	-	8,327
11	5,200	12.50	.60	-	2,949	-	4,713
12	5,300	5.75	.30	1.00	-	-	3,564
13	5,300	9.20	1.30	-	1,358	-	993
14	5,300	2.50	.30	-	-	-	7,697
15	5,700	12.20	2.20	.50	1,292	-	2,639
16	5,300	1.80	.30	-	3,839	-	6,089
17	6,200	9.20	.30	-	21,069	Stratified sand-stone rock may be encountered in the deep cut on this section, say 1,000 yards.	37,498
18	4,100	6.90	.50	-	6,889	-	6,172

NOTE—In reference to sections No. 3, 4 and 17, the inclemency of the weather and shortness of the time allowed for preparing the line of contract, have operated to defer examinations on those sections, which otherwise would have been made, and the results exhibited at the lettings. The occurring of rock cutting on these sections is only supposed from indications on the surface; and the quantity affixed to the respective sections is assumed, for the purpose of calculating the proposals therefor.

sections of the Eastern Division of the Alton and Mt. Carmel railroad.

Bridges and truss-work.		Stone drains.		Brick drains.		Wooden drains.		Remarks.
Lineal feet of bridging.	Lineal feet of truss-work.	No. of drains.	Perches of masonry of 25 cubic yards.	No. of drains.	Perches of masonry of 25 cubic feet (about 500 brick to one perch.)	No. of drains.	Feet (in timber measure) of timber necessary for construction.	
-	-	-	-	2	30	-	-	It is expected that the line on this section will undergo some revision, which may reduce the <i>amount</i> of work, but the <i>character</i> of work will remain the same as now exhibited. A revision of a part of this section may be made, which may lessen the <i>amount</i> of the work, but not the character.
-	a 200	-	-	1	19	1	400	
-	-	-	-	1	50	-	-	
-	-	-	-	1	50	1	810	
-	b 200	1	18	-	-	1	510	
-	c 200	-	-	-	-	1	420	
-	-	-	-	-	-	1	300	
-	-	-	-	-	-	2	1,200	
-	-	-	-	-	-	1	690	
-	d 50	-	-	-	-	2	1,100	
-	-	-	-	-	-	2	910	
-	e 100	-	-	-	-	2	-	The embankment on this section will probably be increased in height, (say over 2 feet,) with a view to dispense with grubbing and to increase the capacity of the side ditches. The note on section 11 is applicable to a part of section 12.
f 120	g 140	-	-	-	-	1	510	
-	-	2	20	-	-	-	-	
-	h 300	1	16	-	-	-	-	
-	-	3	30	-	-	-	-	
-	i 40	2	38	-	-	-	-	
-	-	6	59	-	-	-	-	It is expected that a change will be made in the location of this section that will equalize the cuttings and fillings; perhaps reduce the quantity of the aggregate amount of both—the <i>character</i> of the work remaining nearly as now exhibited. A revision of the line on this section may be made; but it will not materially affect either the amount or character of the work as now exhibited.

NOTE—On sections where revision of the line is contemplated, this work will be performed at as early a day, and with as little delay to the contractors, as possible.

On so much of any section as runs through cultivated land, the fences on both sides of the road-way will be put up, either by the contractor, under the direction and at the estimate of the principal engineer, or by the owner of the land, previous to commencing the graduation of the road in such field.

a Over Great-house creek—about 14 feet elevation. b Over slough—about 6 feet elevation. c Over Coffee creek—about 7 feet elevation. d Over bottom land. e Over Crackle's creek. f In 3 spans. g For double track—see drawings. h In different locations. i Over branch of Still-house creek.

SYNOPSIS of work under contract in the Eastern Engineering District, with

Names of the contractors.	No. of sections.	Length of sections, in feet.	Cubic yards of excavation put into embankment.	Already put into embankment.	Remaining to be put into embankment.	Cubic yards of wasted earth.	Already wasted.	Remaining to be wasted.
CENTRAL BRANCH RAILROAD.								
<i>Division No. 1.</i>								
David Scott & Co.	-	1 4,500	-	-	-	369	369	-
S. & G. Ewing	-	2 5,200	221	-	221	167	167	-
Paddock, Jackson & Lee	-	3 4,200	-	-	-	-	-	-
David Scott & Co.,	-	4 5,600	394	-	394	50	50	-
Same	-	5 4,400	2,016	1,487	529	-	-	-
Same	-	6 5,600	707	426	281	166	166	-
Same	-	7 4,400	2,004	1,209	795	405	-	405
Same	-	8 5,600	568	309	259	133	133	-
J. Ryan, & Cushing & Blake	-	9 5,400	-	-	-	-	-	-
M'Reynolds & Co., & Cushing & Blake	-	10 5,600	5,082	4,582	500	8,505	7,142	1,363
Stark & How, & J. L. Burleigh	-	11 5,600	21,278	18,917	2,361	1,932	1,932	-
John Donegan	-	12 6,000	-	-	-	-	-	-
M'Reynolds & Co.	-	13 6,400	1,381	1,200	181	-	-	-
Same	-	14 5,200	-	-	-	-	-	-
J. W. Brown	-	15 6,000	2,692	1,414	1,278	-	-	-
Same	-	16 5,200	2,794	1,839	955	1,991	1,991	-
Hendrickson & M'Farland	-	17 5,600	-	-	-	-	-	-
Same	-	18 4,600	-	-	-	-	-	-
Cary, Sandford & Wampler	-	*	-	-	-	-	-	-
S. & G. Ewing	-	†	-	-	-	-	-	-
<i>Division No. 2.</i>								
Cushing & Blake	-	32 6,800	122,232	1,065	121,167	3,500	-	-
Johnson, Shepherd & Co.	-	33 5,800	38,911	5,308	33,603	-	-	-
NORTHERN CROSS RAILROAD.								
<i>Division No. 2.</i>								
Stoughton & Patton, Breed & Livingston, & T. H. Cushing	-	11 7,250	75,100	17,000	58,100	9,000	3,000	6,000
Stoughton & Patton	-	12 5,000	-	-	-	1,000	-	1,000
Morgan L. Payne	-	13 5,400	-	-	-	-	-	-
M'Kibben, Cassaday & Co.	-	14 6,150	-	-	-	-	-	-
Same	-	15 6,090	-	-	-	-	-	-
Same	-	16 7,257	400	400	-	200	-	200
Same	-	17 4,810	-	-	-	-	-	-
Same	-	18 6,000	1,200	1,200	-	-	-	-
Same	-	19 6,000	-	-	-	-	-	-
Same	-	20 6,000	-	-	-	-	-	-
Same	-	21 6,000	-	-	-	-	-	-
Same	-	22 6,000	10,000	4,500	5,500	1,500	1,000	500
Same	-	23 5,600	-	-	-	-	-	-
Same	-	24 5,300	2,810	1,200	1,600	400	-	400
Same	-	25 5,300	932	932	-	-	-	-
Same	-	26 5,800	3,080	-	3,080	1,000	-	1,000
Same	-	†	-	-	-	-	-	-

*Superstructure lineal feet of stringers contracted for - 190,000 Mud-sills 210,000
 " do. do. already delivered 29,990 delivered 30,222

Remaining to be done - - - - - 160,010 - - - 179,778

†Timber for superstructure, string pieces delivered, 7,796 lineal feet. Mud-sills 6,142 l. ft.

an abstract of expenditures upon the same, up to December 15, 1838.

Cubic yards of borrowed earth put into embankment.	Already borrowed.	Remaining to be borrowed.	Perches of masonry.	Already done.	Remaining to be done.	Lineal feet of bridging.	Already done.	Remaining to be done.	Number of wooden culverts.	Already built.	Remaining to be built.	Rods of grubbing and clearing.	Already grubbed and cleared.
14,856	3,900	10,956	-	-	-	240	150	90	-	-	-	1,411	1,411
9,507	4,692	4,815	-	-	-	-	-	-	2	2	-	1,519	1,519
4,314	2,219	2,095	-	-	-	-	-	-	1	1	-	1,547	1,547
3,670	2,785	885	-	-	-	-	-	-	1	1	-	1,295	1,295
5,210	5,034	176	-	-	-	-	-	-	1	1	-	1,646	1,646
8,088	7,107	981	-	-	-	290	75	125	1	1	-	1,295	1,295
7,041	6,435	606	-	-	-	120	120	planking	1	1	-	1,646	1,646
-	-	-	-	-	-	500	200	300	-	-	-	-	-
5,333	3,646	1,687	-	-	-	800	300	500	1	1	-	1,501	1,501
4,851	3,381	1,470	-	-	-	425	425	planking	4	4	-	1,276	1,276
8,119	6,894	1,225	-	-	-	-	-	-	2	2	-	-	-
7,789	3,353	4,436	-	-	-	-	-	-	3	3	-	309	309
5,932	2,102	3,880	-	-	-	-	-	-	4	4	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	1,764	-
45,248	-	45,248	-	-	-	-	-	-	-	-	-	1,588	1,000
-	-	-	6,216	1,993	4,223	400	70	330	-	-	-	1,485	1,485
800	-	800	-	-	-	-	-	-	-	-	-	-	-
12,236	10,200	2,036	134	134	-	-	-	-	2	2	-	-	-
600	-	600	-	-	-	-	-	-	1	-	1	-	-
5,648	1,500	4,148	-	-	-	-	-	-	2	-	2	-	-
-	-	-	-	-	-	-	-	-	1	-	1	-	-
-	-	-	-	-	-	-	-	-	2	-	2	-	-
600	-	600	-	-	-	-	-	-	2	-	2	-	-
-	-	-	235	95	190	-	-	-	1	-	1	-	-
1,500	-	1,500	-	-	-	-	-	-	3	-	3	-	-
5,008	2,000	3,008	160	60	100	-	-	-	2	-	2	-	-
5,009	2,400	2,609	-	-	-	-	-	-	3	-	3	-	-
3,553	600	2,955	180	150	30	-	-	-	2	-	2	-	-

‡Sleepers to be delivered 18,000
Delivered - - - 1,360

Remaining - - - 16,640

SYNOPSIS of work under contract in the

Names of the contractors.	No. of sections.	Remaining to be grubbed and cleared.	Am't of sundries.	Already done.	Remaining to be done.	Cash paid on contracts.
CENTRAL BRANCH RAILROAD.						
<i>Division No. 1.</i>						
David Scott & Co. - - -	1	.	\$300	\$200	\$100	\$1,554 55
S. & G Ewing - - -	2	.	.	.	.	1,121 13
Paddock, Jackson & Lee - - -	3	.	50	.	50	1,481 42
David Scott & Co. - - -	4	.	200	.	200	.
Same - - -	5	.	200	.	200	.
Same - - -	6	.	200	.	200	.
Same - - -	7	.	200	.	200	.
Same - - -	8	.	75	40	35	9,752 14
J. Ryan, & Cushing & Blake - - -	9	.	100	8	92	5,166 80
M'Reynolds & Co., & Cushing & Blake - - -	10	.	150	.	150	5,871 98
Stark & How, & J. L. Burleigh - - -	11	.	.	.	.	8,410 12
John Donegan - - -	12	.	150	.	150	966 35
M'Reynolds & Co. - - -	13	.	.	.	.	.
Same - - -	14	.	150	90	60	2,229 08
J. W. Brown - - -	15	.	100	33	67	.
Same - - -	16	.	100	21	79	1,541 21
Hendrickson & M'Farland - - -	17	.	.	.	.	.
Same - - -	18	.	.	.	.	3,748 85
Cary, Sandford & Wampler - - -	.	.	.	.	.	1,928 35
S. & G. Ewing - - -	.	.	.	.	.	132 06
<i>Division No. 2.</i>						
Cushing & Blake - - -	32	1,764	.	.	.	253 47
Johnson, Shepherd & Co. - - -	33	588	.	.	.	1,129 02
NORTHERN CROSS RAILROAD.						
<i>Division No. 2.</i>						
Stoughton & Patton, Breed & Livingston, & T. H. Cushing - - -	11	.	8,900	3,863	5,037	21,688 52
Stoughton & Patton - - -	12	.	.	.	.	.
Morgan L. Payne - - -	13	.	.	.	.	1,228 01
M'Kibben, Cassaday & Co. - - -	14	.	.	.	.	.
Same - - -	15	.	.	.	.	.
Same - - -	16	.	70	.	70	.
Same - - -	17	.	50	.	50	.
Same - - -	18	.	125	.	125	.
Same - - -	19	.	100	.	100	.
Same - - -	20	.	100	.	100	.
Same - - -	21	.	100	.	100	.
Same - - -	22	.	150	.	150	.
Same - - -	23	.	125	.	125	.
Same - - -	24	.	150	.	150	.
Same - - -	25	.	100	.	100	.
Same - - -	26	.	200	.	200	11,187 59
Same - - -	.	.	.	.	.	.

Eastern Engineering District—Continued.

Cash retained on contracts.	Total cost of work as per definite locations.	Estimated cost on the approximate locations.	Remarks.
\$998 09	\$5,061 91	\$5,713 61	
435 05	2,456 28	2,378 80	
450 73	2,578 93	2,868 60	Finished except dressing.
.	1,814 23	2,168 42	
.	1,977 35	2,661 58	
.	2,095 38	2,323 24	
.	4,941 87	6,599 71	
1,710 96	3,125 41	3,192 76	
583 86	7,620 41	7,262 35	Finished except bridging.
889 45	12,816 92	12,523 10	
940 56	9,084 64	7,398 37	
181 21	1,227 41	944 55	Finished except dressing.
.	1,396 67	1,448 60	
393 43	1,577 00	1,167 66	Finished except dressing.
.	1,860 77	1,815 04	
282 30	2,068 65	3,219 56	The approximate grade was much changed on the de-
.	.	.	Finished and accepted. [finite location.
.	3,748 85	3,606 53	Finished and accepted.
340 33	14,968 00		
30 93	2,025 00		
44 73	.	87,475 16	Masonry and bridging not contracted for.
199 24	.	22,270 84	
6,324 54	91,686 00	93,778 54	
216 72	2,093 73	3,548 07	Finished except 1 stone culvert and dressing.
.	.	.	Finished except dressing, &c.
.	.	.	Finished except dressing, &c.
.	.	.	Finished except dressing, &c.
.	.	.	Finished except dressing, &c.
.	.	.	Finished except dressing, &c.
.	.	.	Finished except dressing, &c.
1,974 35	22,080 07	20,801 64	
.	.	.	Contract now abandoned.

ABSTRACT of cash received and disbursed by M. K. Alexander, Commissioner B. P. W., Fourth Judicial Circuit, Illinois.

	Cash Received.		Eastern district.	Cash disbursed.					
	Drafts.	Special drafts.		Total.	Names of contractors.	Construction.	Right of way.	Engineering.	Sundries.	Total.
Northern Cross Railroad	\$45,640 26		\$45,640 26	.	.	\$300	\$4,167 80	\$1,666 89	\$6,184 69
Central Branch Railroad	50,000 00		54,945 76	.	.	140	4,707 20	2,063 32	6,910 53
Central Railroad				.	.	.	1,554 23	406 65	1,960 91
General expenditures	8,500 00		8,500 00	.	.	.	4,217 75	3,184 70	7,402 45
				<i>Northern Cross Railroad.</i>					
				Cassaday, McKibben & Co.	\$11,187 63				
				Morgan L. Payne	1,228 01				
				Stoughton & Patton	11,450 77				
				Breed & Livingston	6,122 09				
				Thomas H. Cushing	4,115 66				
				<i>Central Branch Railroad.</i>					
				Stark & How	4,449 22				
				J. M' Reynolds & Co.	5,557 93				
				James Ryan	2,457 87				
				Joseph L. Burleigh	5,427 40				
				C. G. Van Buren	85 51				
				John Donegan	966 35				
				Hendrickson & McFarland	3,748 85				
				David Scott & Co.	11,306 69				
				Paddock, Jackson & Lee	1,481 42				
				S. & G. Ewing	1,194 36				
				J. W. Brown	1,541 21				
				Ray & Ewing	59 86				
				Cary, Sandford & Wampler	1,928 31				
				Johnson & Shepherd	1,129 02				
				T. H. Cushing & Blake	5,087 41				
Total	\$104,104 26	\$4,945 76	\$109,086 02			\$440	\$14,646 93	\$7,321 60	\$105,729 21
									\$102,934 21
									+2,795 00

*Expenditures of the above engineering comprise the amounts of cash paid to the engineers and other men composing the surveying parties.
 † M. K. Alexander's compensation as Commissioner. Fractions excluded in print.

Report of C. L. Seymour, Assistant Engineer.

RAILROAD OFFICE,

Mount Vernon, October 15, 1838.

TO EDWARD SMITH, Esq.

Principal Engineer of the Southern Cross Railroad, &c.

SIR: In accordance with your letter of instructions, dated August 13, I proceeded on to Albion with the party and commenced running the line west towards Fairfield. It was the intention to find, if possible, a nearer route to Fairfield than was made by the former survey, by curving to the north and following up the valley of Woodland creek, and cross the ridge on the west side of this valley, and to pass near the mouth of White-oak branch in the direction of Fairfield; and with this view I commenced at the west end of section number 18, near Albion, and ran the west as far as Woodland creek; thence, curving to the north and following up the same, a distance of about three miles, before I could find a suitable place for crossing the ridge. The valley of Woodland creek lies about five degrees east of north, thus throwing the line off in a north-easterly direction, instead of west, which direction the line should take. From this point to the mouth of the White-oak branch, which place you mention in your letter of instructions, the line assumes a southwestwardly direction for a distance of about seven or eight miles, thus making the distance greater than by the old survey.

Having ascertained this fact, I returned to the starting point and continued the tangent on the west end of section number 18, and ran south 67 degrees west, to near Sidney Springs; thence curving to the north, and passing near William Wood's house; thence curving to the west until we obtain north 81° west. On this course the line extends to Fairfield, a distance of about twelve miles, on one straight line, but owing to the rough and broken country on the west side of the Little Wabash river, I returned to near Wm. Wood's, and ran the line north 88 degrees west, until we reached the White-oak branch; thence curving to due west, and ran the line on as far as David King's farm, and adopted this as the most feasible route; and as the time was near when the party were to be at Carlyle, I sent them on agreeable to your instructions.

Since the return of the party from the Kaskaskia river, at Carlyle, I have revised the line from Albion west, as far as William Wood's place of residence, by curving to the south, at the end of the 18th section, 3 degrees, and running south 63 degrees west, to near Sidney Springs; which line runs upon level ground the greater part of the distance, and close along the edge of the broken ground, and making a tangent of about six miles in length; thence curving to the north upon a radius of 1,432 feet, and joining the former line. I have also meandered the Little Wabash river, near the mouth of the White-oak branch, for a distance of about one mile and a half, and find that the line could be changed to advantage by curving one degree more south, near Wm. Wood's, which would extend the tangent to beyond or west of David King's place of residence; thus superseding the necessity of a curve at the mouth of White-oak branch, and also lessen the amount of embankment on section 27. This alteration I should have made, had the time before the letting been sufficient to have allowed me to do so.

The map, profile, and plans of bridges, together with an estimate of cost for grading sections numbered 25, 26, and 27, are herewith submitted for your inspection by

Your obedient servant,
C. L. SEYMOUR.

Estimate of cost for grading Sections No. 25, 26, and 27, upon the Eastern Division of the Southern Cross Railroad, extending from Alton to Mount Carmel.

SECTION No. 25.

11.50	acres of clearing, at \$30 per acre	-	-	\$345 00
3.75	acres of grubbing, at \$125 per acre	-	-	468 75
14,644	cubic yards of embankment, at 20 cents per yard	-	-	2,928 80
200	feet of truss bridging, at \$5 per foot run	-	-	1,000 00
Total	-	-	-	<u>4,742 55</u>

SECTION No. 26.

12.63	acres of clearing, at \$30 per acre	-	-	\$378 90
4.13	acres of grubbing, at \$125 per acre	-	-	516 25
24,015	cubic yards of excavation, at 15 cents per yard	-	-	3,602 10
9,399	cubic yards of embankment, at 20 cents per yard	-	-	1,879 80
200	feet of truss bridging, at \$5 per foot run	-	-	1,000 00
Total	-	-	-	<u>7,377 05</u>

SECTION No. 27.

12.63	acres of clearing, at \$30 per acre	-	-	\$378 90
4.13	acres of grubbing, at \$125 per acre	-	-	516 75
52,925	cubic yards of embankment, at 20 cents per yard	-	-	10,585 00
1,166	cubic yards of masonry for bridge abutments, at \$6 per yard	-	-	6,996 00
100	feet of bridging over White-oak branch, at \$10 per foot run of the bridge way	-	-	1,000 00
100	feet of truss bridging, at \$5 per foot run	-	-	500 00
Total	-	-	-	<u>19,676 65</u>

SUMMARY.

Section No. 25	-	-	-	\$4,742 55
Section No. 26	-	-	-	7,377 05
Section No. 27	-	-	-	19,676 65
Total of the three sections	-	-	-	<u>31,796 15</u>

NOTE.—The report of J. W. HOYT, Engineer of the Eastern Engineering District, to the Commissioner of the Fourth Judicial Circuit, will be found near the close of the volume; also the report of D. BURR, Principal Engineer of the States of Indiana and Illinois, on the improvement of the Wabash river.

EXHIBIT No. V.

REPORT OF JOEL WRIGHT,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, Dec. 13, 1838.

To the **PRESIDENT** of the *Board of Public Works*
of the *State of Illinois*.

The undersigned, Commissioner of the fifth judicial circuit, has the honor to submit the following report.

Since that part of the Northern Cross railroad lying in this circuit was placed under the superintendence and control of the Commissioner of the first circuit, the only work remaining in the charge of the undersigned, is the Peoria and Warsaw railroad. The report of H. P. Woodworth, chief engineer, with the schedules, numbers 1 and 2, thereto annexed, which are herewith submitted, will show the operations on this road since the last meeting of the Board, and the state of the work under contract on the eastern division of the same on the first, and on the western division, on the 15th day of November last. Since those dates there has been paid, for the legal per centage on work done on the first named division, the sum of \$4,095 61.

The following is a statement of the receipts and expenditures by the undersigned, since his last semi-annual report.

Balance on hand as reported	-	-	-	\$5,041 49
Amount drawn for the Peoria and Warsaw railroad	-	-	-	65,271 43
Amount drawn for the general fund	-	-	-	1,950 00
Amount of contract drafts	-	-	-	6,699 74
Property sold	-	.	-	5 00
				\$78,967 66

Expended on the Peoria and Warsaw railroad	\$50,188 03	-	-	8,212 26
Same (charged to general fund)	-	-	-	6,699 74
Same, contract drafts	.	-	-	65,100 03

Amount for Northern Cross railroad charged	-	-	-	731 52
to general fund	-	-	-	13,136 11
Balance, being cash on hand	-	-	-	78,967 66

78,967 66

The whole amount received by the undersigned since the commencement of the public works is as follows:

Amount drawn for Peoria and Warsaw railroad	-	\$74,271	43
Amount of contract drafts for same	-	6,699	74
Amount of property sold	-	103	25
Amount drawn for Northern Cross railroad	-	7,000	00
Amount of general fund	-	4,950	00
		<hr/>	
		\$93,024	42

The amount expended is—

On the Peoria and Warsaw rail'd	\$65,390	78
Same (charged to general fund)	- 9,834	79
		<hr/>
		75,225 57
Northern Cross railroad	- 1,822	96
Same (charged to general fund)	- 2,839	78
		<hr/>
		4,662 74
Balance, being cash on hand	-	13,136 11
		<hr/>
		\$93,024 42

All which is respectfully submitted.

J. WRIGHT, *Com'r, &c.*

Report of H. P. Woodworth.

RAIL ROAD OFFICE,
La Salle county, Nov. 27, 1838.

To the COMMISSIONERS of the
Northern Engineering District of Illinois.

GENTLEMEN: In accordance with practice and precedent, and in the discharge of my duty as your chief engineer, I have the honor of laying before you, with other accompanying documents, the following brief report.

You are well aware of the peculiar state of things relating to the duties of chief engineer in this district, when I first entered upon those duties—roads located, and works at various points put under contract, without the supervision or even direction of a general superintending head—assistant engineers tenacious of their location, plans of work, and schemes of operation, and naturally and justly jealous of innovations upon the same—contractors ready to exclaim against any change in grade direction, or kind of work—and what promises to be still more annoying, envious and jealous and disappointed persons were known to stand ready to seize upon every thing not strictly in accordance with their bigoted and limited notions upon what might perhaps be beyond the comprehension of their shallow understandings, upon which to base arguments to prejudice the public mind against individuals in particular, and the system of internal improvement in general. I have, however, endeavored to conduct the public works under my charge, without allowing the above considerations to influence me at all to the prejudice of public interest.

On entering upon my duties as your chief engineer, my first care was to make myself fully and thoroughly acquainted with the nature, situa^s

tion and progress of every work of improvement in this district, by my own personal examinations; and, also, thoroughly to inform myself with the plans and views of my assistants in relation to them. The results of my investigations were very satisfactory. Every thing seems to have been conducted with accuracy and judgment, and in no instance should I have differed essentially in the locations, plans of work, &c. from the gentlemen engineers who had conducted the work thus far; and I am happy, at this time, to bear witness to their individual skill and the untiring zeal which has been manifested by them in conducting the different works over which they have the more immediate superintendence. Of those works I will speak in detail.

PEORIA AND WARSAW RAILROAD.

The twelve miles of this work, which is under contract from Peoria out, bids fair for completion within the specified time. No unexpected difficulties have been encountered, and the work for the most part has gone on smoothly. Some slight changes in grade and direction have been found necessary, but in no instance, it is believed, to the prejudice of the construction. Rock has in some instances been found where earth only was expected, which of course increases the expense of excavation. The accompanying schedule (number 1,) will exhibit to you the amount, kind and cost of work done, and also to be done on this portion of the road. On the twelve miles from Warsaw less has been accomplished, notwithstanding every exertion has been made to forward the work. It is believed, however, that the contract may be fulfilled in due season.

Schedule number 2 exhibits the state of this portion of the road.

CENTRAL RAILROAD.

That portion of this road extending twenty miles from Galena was put under contract in May last. Contractors immediately commenced their operations with demonstrations at least of conducting their respective jobs with much energy and honesty. Unfortunately it has turned out otherwise. Contractors absconded, jobs were abandoned, and notwithstanding the greatest exertions of the resident engineer, much confusion and delay ensued. Other causes also had their influences to perplex and retard the progress of this work; among which it is sufficient to mention the protracted and painful illness of our late and much lamented Commissioner, Col. Stephenson—the unusual sickness of the season, and the difficulty experienced in procuring laborers during the mining season. Things, however, are fast assuming a new and settled state, and with the exception of Doct. Power's contract, (which I think ere long must suffer a change) there is a fair prospect that the work will be conducted as it should be, and that the final completion will not be prolonged beyond the specific time. For further particular information, I refer you to schedule number 3.

In the month of June, twenty-two miles of this road, on the Illinois river, was put under contract. Fortunately this work fell into good hands, and has so far been conducted under fortunate circumstances, and conse-

quently has rapidly progressed towards completion. No difficulties have as yet been encountered, and there appears to be made every necessary arrangement, by the contractors, for pressing forward with their heavy jobs during the ensuing winter; and there appears nothing at present to prevent the prompt fulfilment of all the contracts. See accompanying schedule number 4.

ROCK RIVER IMPROVEMENTS.

The improvements of the Lower rapids were put under contract in May. Able and experienced contractors are conducting that work. The stage of water has been very favorable so far, and as much has been accomplished as could have been expected. Some deviation from the original plan of work will be found necessary, on account of not being able to procure the stone as first contemplated. The cost of the work will not be materially altered by the proposed change, and it is believed the work will be completed at an early period and in the best possible manner. See schedule number 4.

On the whole I believe there has been as much accomplished on the public works as could have been reasonably expected, and I am confident in saying that the same quantity of work similarly situated has never been conducted with more enterprise and a fairer promise of speedy completion. It is also worthy of remark that nearly all the heavy and difficult and expensive work is embraced in the present contracts, and that which remains is principally light grading, upon smooth open prairie, which probably will not cost, on an average, over \$1,000 per mile.

ENGINEERING AND FIELD OPERATION.

Having two often experienced the evils of hurried locations, and of preparing work for contract on short notice, I have caused as much of our railroad lines to be located as seemed consistent with economy and the strength of our engineering parties. On the eastern division of the Peoria and Warsaw road, twenty miles have been located, extending from the work under contract to Canton, and on the western divisions ten miles extending to Carthage. The company that made these locations have been engaged in making examinations and surveys for the improvement of the route between Carthage and Macomb. The results of those operations will be reported to the acting Commissioner as soon as they can be made out.

All that portion of the Central railroad lying in the seventh circuit has been located, and the line of location continued as far as the Rocky ford in the sixth; also on the western or Galena division, ten miles extending to Savannah, has been prepared for contract. Reports, maps, plans profiles and estimates on the above work, will be presented to the acting Commissioner as early as practicable.

There has been so much local as well as individual feeling exhibited in relation to the location of the railroad on Rock river, that I have deemed it expedient to have thorough surveys made on every possible route between Savannah and the above river. For this purpose there has been a party in

the field since about the first of August. The result of those surveys will be reported to the acting Commissioner as early as possible, and, together with what was done last year, will afford him a sufficient data at least to make a location on the cheapest route. Other considerations, however, besides the results of bare engineering operations, should have their due weight in deciding upon the point for crossing Rock river.

The present season has sufficiently demonstrated the necessity of some improvements at least in the navigation of the Illinois river. I have taken advantage of the very low stage of water, and caused surveys to be made, with examinations of all obstructions to steam navigation, from the terminating of the Michigan canal to Peoria. The accompanying report of Gen. Ransom will furnish the detail of the above mentioned survey.

Such, gentlemen, is a brief view of the progress, present state, and future prospects of the works of internal improvement in the northern engineering district. Much has been done, and much credit certainly is due the engineering corps generally, and to the principals who have had the more immediate control of the different works in particular.

In conclusion, perhaps you may expect from me suggestions in relation to future operations. On this point I feel no little diffidence, knowing, as I do, that much must depend upon future circumstances over which you may have no control. It will not be improper, however, for me to suggest and urge the propriety of pressing forward the improvement of the rivers. The Illinois river in particular demands immediate attention—and as the improvement consists principally in the removal of bars, the work may be commenced early in the spring. Dredging machines can only be used to advantage in this operation, and as there are two now at this place which are peculiarly well calculated for river work, I would suggest the propriety of making some arrangements to employ them as early as possible. Even one of those machines will do much towards improving the navigation, even in one season. I would also recommend that such portions of the different roads as will form continued lines from navigable waters to some important port, or towns in the interior, should be put under immediate contract, and the work hastened to completion. Utility might then soon be demonstrated to the skeptical, and visible tangible facts could be made use of to combat opinions and prejudices against the present system of internal improvements. For the above purpose let the lines between Peoria and Canton, and between La Salle and Rock river, at least. Those two portions, in my opinion, possess advantages that should not be overlooked, and which will readily suggest themselves to your understandings. Other work might be put under contract to good advantage, and without prejudicing in the least works already begun.

Respecting superstructure, &c. I deem it premature to make any suggestions, but will remark that whatever plan or plans may be adopted, there appears to be an abundance of good material, which can easily be obtained for any of our purposes, without going far from the lines.

H. P. WOODWORTH.

SCHEDULE No. 1.

Amount of work done on the Eastern Division of the

Number of Sections.	Grubbing & clearing.		Cubic yards of excavation.		Cubic yds of embankment.		Cubic yards stratified rock excavation.		Cubic yards of rough masonry.		
			Price per yard.	Amount.	Price per yard.	Amount.	Price per yard.	Amount.	Price per yard.	Amount.	
1	\$36 00	658	16	\$105 28	3,100	22	\$682 00	-	-	2,255	33 00
2	40 00	1,209.2	14	169 28	2,339.15	18	421 02	-	-	+ 9.3	3 00
3	50 00	3,874	15	581 10	6,121	16	979 36	-	-	19.35	3 50
4	100 00	22,878	14	3,202 92	24,648	14	3,450 72	-	-	26.88	3 50
5	250 00	7,238	16	1,158 08	12,204	17	2,074 68	800	1 00	\$800	875 3 00
6	800 00	1,041	18	187 38	18,121	16	2,899 36	395	1 00	395	- -
7	300 00	-	-	-	-3,500	19	665 00	-	-	-	- -
8	20 00	22,014	18	3,962 52	2,200	16	352 00	307	1 00	307	52.40 4 00
9	12 00	8,811	13	1,145 43	13,505	16	2,160 80	-	-	-	106.88 2 00
10	120 00	2,042	14	285 88	* 2,042	17	347 14	-	-	-	54 2 50
11	5 00	11,204	14	1,568 56	1,761	15	264 15	-	-	-	+ 4.37 3 00
12	25 00	1,287.05	14	180 19	7,594.62	15	1,139 19	-	-	-	+ 38.62 3 00
	1,758 00	-	-	12,546 62	-	-	15,435 42	-	-	1,502	- -

Amount of work to be done on the Peoria and

1	-	-	-	-	309	22	\$67 98	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-
3	-	2,025	15	\$303 75	4,917	16	786 72	-	-	-	-
4	-	8,464	14	1,184 96	9,024	14	1,263 36	-	-	-	-
5	\$50 00	2,946	16	471 36	5,970	17	1,014 90	500	1 00	\$500	- -
6	480 00	12,375.1	18	2,227 50	38,755	16	6,200 80	2605	1 00	2,605	- -
7	25 00	11,874	16	1,899 84	59,953	19	11,391 07	-	-	-	- -
8	-	4,447	18	800 46	1,667	16	266 72	-	-	-	- -
9	-	-	-	-	1,236	16	197 76	-	-	-	215 2 50
10	-	7,477.41	14	1,046 83	50,141	16	8,022 56	-	-	-	- -
	555 00	-	-	7,934 70	-	-	29,211 87	-	-	3,105	- -

* R. B.

+ Final estimate.

SCHEDULE No. 1.

Peoria and Warsaw Railroad, up to the 1st November, 1838.

Amount.	Cubic yards of dressed masonry.	Price per yard.	Amount.	Cubic yds slope wall.	Price per yard.	Amount.	Sundries.	Total amount.	Fifteen per cent. discount.	
\$67 65	-	-	-	-	-	-	-	\$890 93	\$133 63	\$757 30
27 90	34 50	-	\$12	-	-	-	-	670 20	-	670 20
67 72	35 00	-	15	-	-	-	-	1,693 18	253 97	1,439 21
94 00	-	-	-	330	2 00	\$660 00	a \$79 50	7,587 14	1,133 07	6,449 07
262 50	{104 4 00 428 4 25}	-	418 } 1,819 }	794.5	2 00	1,589 00	b 1800 00	10,246 26	1,536 94	8,709 32
-	-	-	-	105.77	2 00	211 54	c 75 00 d 1019 52	5,512 80	826 92	4,685 88
-	-	-	-	-	-	-	-	965 00	144 75	820 25
208 00	-	-	-	-	-	-	e 100 00	4,949 52	742 43	4,207 09
213 76	-	-	-	-	-	-	-	3,531 99	529 80	3,002 19
135 00	-	-	-	-	-	-	f 1600 32	2,488 34	375 25	2,113 09
131 10	-	-	-	-	-	-	-	1,968 81	-	1,968 81
115 86	-	-	-	-	-	-	-	1,460 24	-	1,460 24
1,323 49	-	-	2,260	-	-	-	4,674 34	41,964 41		

Warsaw Railroad, in the Eastern Division.

-	-	-	-	-	-	-	-	\$67 78		
-	-	-	-	-	-	-	-	1,090 47		
-	-	-	-	270	2 00	\$540 00	-	2,988 32		
-	-	-	-	200	2 00	400 00	g \$840	3,276 26		
-	-	-	-	-	-	-	h 4 000	15,513 30		
-	-	-	-	-	-	-	i 3,000	16,315 91		} Rather too much
-	-	-	-	-	-	-	j 1,000			
-	-	-	-	-	-	-	k 400	2,467 18		
\$537 50	-	-	-	-	-	-	-	197 76		
-	-	-	-	-	-	-	-	9,606 89		
537 50	-	-	-	-	-	940 00	9,240	51,524 07		

a 79.5 cubic yards rock in foundation wall. b Bridge and tressle work. c Excavation of abutment pits. d Excavation of the channel of creek 5,664 cubic yards. e 50 cubic yards rock hauled, (not laid.) f 10,002 cubic yards embankment borrowed earth, at 16 cents. g Bridge and tressle. h Bridge abutments. i Bridge abutments. j Paving drains. k Bridge abutments.

SCHEDULE No. 2.

Estimate of work to be done on the Western Division of

Number of Sections.	Clearing & grubbing.		Cubic yards of embankment.		Cubic yards of excavation.		Cubic yards of solid rock excavation.		Cubic yards stratified rock excavation.		Cubic yards of rough masonry.	
	\$	cts	\$	cts	\$	cts	\$	cts	\$	cts	\$	cts
116	-	-	-	-	-	-	-	-	-	-	-	-
115	200	7,598	17	1291 66	3,070	16	491 20	-	-	-	-	-
114	270	10,609	17	1803 53	4,648	16	73 68	-	-	-	-	-
109	260	5,713	17	971 21	4,413	16	706 08	-	-	1,000	40	400 00
108	250	9,667	17	1643 39	3,979	16	636 64	-	-	-	-	266 4 00
107	-	-	-	-	-	-	-	-	-	-	-	300 4 00
106	100	10,524	17	1789 08	2,491	16	398 56	-	-	-	-	147 4 00
105	-	3,025	16	484 00	3,819	15	572 85	-	-	-	-	200 4 00
107	-	1,997	17	339 49	974	15	146 10	-	-	-	-	-
106	-	220	16	35 20	1,793	14	251 02	-	-	-	-	36 4 00
105	-	8,545	19	1623 50	1,941	14	271 74	-	-	-	-	21 4 00

Estimate of work done on the Western Division of the

116	50	5,240	16	838 40	14,702	16	2352 32	822	125	1027 50	3,676	40	1470 40	{ 76½ 3 50
114	250	270	17	45 90	2,034	16	330 24	-	-	-	715	40	286 00	{ 9½ 5 00
111	100	1,632	15	244 80	5,224	14	731 36	38	200	76 00	29	95	28 00	191 2 00
109	-	2,434	16	389 44	4,890	15	733 50	-	-	-	-	-	-	45½ 3 50
108	-	4,971	14	720 79	3,374	13	455 49	-	-	-	-	-	-	-
107	-	1,744	17	296 48	589	15	88 35	-	-	-	-	-	-	8 4 00
106	-	14	16	2 24	3,011	14	421 54	-	-	-	-	-	-	-
105	-	1,420	19	269 80	3,971	14	555 94	-	-	-	-	-	-	-
400	-	-	-	2807 85	-	-	5668 74	-	-	1103 50	-	-	1784 40	-

SCHEDULE No. 2.

the Peoria and Warsaw Railroad, after November 15, 1838.

Amount.	Cubic yards of dressed masonry.	Price per yard.	Amount.	Cubic yards of slope wall.	Price per yard.	Amount.	Sundries.	Total amount.	Fifteen per cent. discount.	Total amount paid.
\$		\$	\$		\$	*\$	\$	\$		
1,064 00	.	.	.	300	2 50	5,000	.	5,000 00		
1,200 00	.	.	.	.	.	750	.	3,796 86		
588 00	.	.	.	.	.	.	.	4,417 21		
800 00	.	.	.	.	.	.	.	2,325 29		
.	.	.	.	.	.	.	.	3,330 03		
.	.	.	.	.	.	.	.	+10,000 00		
.	35	5 00	175 00	.	.	.	.	2,462 64		
.	145	6 50	942 50	.	.	.	.	1,999 35		
154 00	.	.	.	.	.	.	‡ 253 40	882 99		
84 00	.	.	.	.	.	.	.	370 22		
710 00	.	.	.	.	.	.	.	2,605 24		
								37,389 83		

Peoria and Warsaw Railroad, up to November 14, 1838.

267 16}	88	5 50	484 00	706	2 00	1,412 00	a 381 30	\$8,529 33	1,279 40	7,219 93
46 25}	-	-	-	-	-	-	-	912 14	136 82	775 32
-	-	-	-	-	-	-	-	5,381 16	807 17	4,573 99
382 00	418	7 00	2,926 00	10½	2 00	21 00	b 872 00	1,587 56	238 13	1,349 43
158 67	34.86	7 50	256 95	-	-	-	c 40 00			
-	-	-	-	-	-	-	d 9 00			
-	-	-	-	-	-	-	e 77 80	‡ 1,254 08	-	1,254 08
32 00	-	-	-	-	-	-	f 108 45	525 25	78 79	446 49
-	-	-	-	-	-	-	-	423 78	63 56	360 22
-	-	-	-	-	-	-	-	825 74	123 86	701 88
886 08	-	-	3,666 95	-	-	1,433 00	1,668 55	19,439 07		

* Cannot give an accurate estimate of this section, but I think \$5,000 will complete it.

† Cannot estimate accurately, say \$10,000. ‡ Side drains. † Final estimate.

a Coffers-dams, foundations, &c. b Sundries not to be described. c 200 cubic yards of excavation in abutment pits. d Levelling foundation of works. e 389 cubic yards of excavation in extra drains. f 723 cubic yards of side drains.

EXHIBIT No. VI.

REPORT OF JOHN DIXON,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, December 15, 1838.

To the Hon. WILLIAM KINNEY,

President of the Board of Public Works.

The undersigned, acting Commissioner of the sixth judicial circuit, has the honor to report:

That his duties, as such, commenced on the 14th day of August last; previous to which time the grading of twenty miles of the Central railroad, from Galena south, had been put under contract on terms highly favorable to the State, considering the high price of labor and subsistence, compared with other sections of the State. A large portion of the contractors have prosecuted their work with energy. Two, only, have proved faithless—their jobs have been re-let at a small advance above the former price.

A contract for the improvement of the Lower rapids of Rock river was let by my predecessor in May last for the sum of sixty thousand three hundred and eighty-nine dollars—about two thousand dollars over the engineer's estimate; which, with the cost of construction at Prophet's town, estimated by the engineer at twelve hundred and eighty dollars, together with the cost of surveys and incidental expenses properly chargeable to that work, will reduce the appropriation below the cost of construction necessary at the Upper rapids, (see engineer's report herewith submitted,) estimated at \$85,295 26. So that the amount properly applicable to that work, under the law, would be inadequate to its completion; in consequence of which, the operations at that place were suspended.

The estimate of the engineer charged with the survey of that river in 1837, is \$178,548; therefore, the additional sum of \$78,548 will be requisite to complete the whole improvement, and afford the depth of four feet water, at the lowest stage, from the mouth of the river to the State line. By such improvement, 165 miles of navigation will be opened through a country possessing, to an unequalled extent, all the natural advantages calculated to render prosperous and happy a population,

who, for intelligence and enterprize, will compare with those of any other portion of globe.

I regret that it is not in my power, at this time, to give a full detail of operations in this circuit. Much of the information necessary can only be derived through the medium of the chief engineer. A full report from him will unavoidably be delayed for a few days. I must therefore ask the indulgence of the Board, in order that the necessary information may be obtained on which to predicate a full report of all the operations under my charge.

The total amount of expenses since I entered upon the duties of my office, as Commissioner, up to the first day of December inst., as per vouchers on file in the office of the Fund Commissioners, is \$48,257 30½. Of this sum, \$8,436 25 is charged to the Rock river improvement, and \$39,821 05½ to the Central railroad; the liability for a large amount of each had accrued previous to my appointment. The total amount drawn from the Fund Commissioners, up to this date, is \$56,152 67½, leaving a balance on hand of \$7,895 47.

In consequence of the death of my predecessor before I had an opportunity of seeing him after my appointment, and his executors not having yet qualified (so far as my knowledge extends) I shall not be able to give the necessary information relative to his operations or affairs, which, under other circumstances, should be reasonably expected.

Respectfully submitted.

JOHN DIXON,

Commissioner Sixth Judicial Circuit.

ENGINEERS' OFFICE, *May 15, 1838*

To the HON. JAMES W. STEPHENSON,

Commissioner of Public Works for the Sixth Judicial Circuit.

SIR: After the completion of the surveys of Rock river, several circumstances prevented me reporting to the meeting of the Board, the result of my examinations and my views, as to the improvement of a river which, by the removal of a few obstructions, will open a free communication with one of the most beautiful portions of the State.

The river is now navigable, in an ordinary stage of water, for boats of three to four feet draft, with the exception of two points, which will require the aid of dams and locks to render them navigable. When the river is at its highest stage, boats that have power enough to overcome a current of seven to eight miles per hour, (which is the velocity of the water at each of these points above mentioned) would find no difficulty in ascending the river as far as the mouth of the Peeketonokee, which might be made a navigable stream with very little expense, and would afford an easy communication with the mineral region. This stage of water, however, lasts but a short time, and comes so early in the spring that it affords no advantage.

My object now is to present to you a brief detail of the state of Rock river in its lowest stages of water, of the different impediments to its navigation, of the mode of improvement, and of the probable cost

to render that river navigable, when in that low stage, from its confluence with the Mississippi to the State line, adjoining Wisconsin, a distance of one hundred and sixty-five miles. The first difficulty to be overcome is the Lower rapids, opposite Rock Island city, about three miles from the mouth of the river. The length of these rapids is three-fourths of a mile, and the total fall in that distance is six and a half feet. About half a mile above the rapids, the river is divided into two branches by a succession of islands. The south branch is from eight to nine hundred feet wide, very shallow, has a rocky bottom, and offers no advantages for improvement. The north branch has the deepest channel, and is contracted in many places to the width of four hundred feet by the bluffs near Rock Island city, on one side, and Vandruff's island on the other, which extends the whole length of the rapids.

The elevation of the banks will admit the erection of a dam sufficiently high to back the water some distance beyond the head of the rapids, and improve the channel at that point. A small dam will also be required across the slough dividing Vandruff's island from another island extending up the river nearly half a mile—the main dam being placed as far down the rapids as the elevation of the bank of the island will permit. A canal of nineteen hundred feet in length will be required to reach the foot of the rapids. The island will be the most favorable place for the canal, the excavation being very easy, and enabling us to have its termination near the deepest channel of the river below.

A guard-lock will be required at the entry of the canal, and a lock of seven and a half feet lift at its termination. The bed of the river at these rapids is formed of calcareous rock, which is found also in abundance on the lower part of Vandruff's island, as well as in Rock Island city; and will, as far as I have been able to ascertain, furnish a good material for the construction of the locks.

The Lower rapids being one of the two most important points of improvement on Rock river, maps, on a large scale, will accompany this report, and will give you a more clear idea of the situation of the rapids, and of the mode I purpose to adopt for their improvement.

Another plan had been suggested—which was to excavate a canal three-fourths of a mile, or the whole length of Vandruff's island, and to dispense with the dam. This mode of improvement, which would appear in itself the most permanent, offers fewer advantages, not only on account of its being more expensive, but because the channel of the river about Vandruff's island is not of a sufficient depth; that the work would be more exposed to the frequent rise and fall of the river, and the State be deprived of the immense benefit of a water-power, created by the dam, on each side of the river.

From the Lower rapids to Prophetstown, the river offers all possible advantages for navigation, having a channel with no less than four and a half feet of water. The width of the river varies from eight to ten hundred feet, and the total fall from Prophetstown to the head of the Lower rapids, a distance of fifty-two miles, is 28.08 feet.

The velocity of the current is three miles per hour. Opposite Prophetstown, for a distance of eighteen hundred feet, the river is more shallow, its deepest channel varying from three to four feet. This por-

tion of the river can be easily improved by means of a brush and gravel wing-dam, one hundred and fifty feet in length and four feet high, from the north side of the river to a little island opposite the village.

From this last place to the foot of the Upper rapids the channel of the river has no less than six feet of water; the velocity of the current averages three and a half miles per hour, and the total fall in that distance, which is twenty miles, is 24.12 feet.

The Upper rapids is the second important point to be improved on Rock river; which, at that place, extends to a width of from one thousand to thirteen hundred feet. The length of the rapids is one mile and a quarter, and the total fall in that distance is 8.24 feet.

The bottom of the river, except at the foot of the rapids, is formed of a sandy calcareous rock of a very smooth surface. The banks of the stream are from twelve to thirty feet high, with the exception of the north bank, which, at the foot of the rapids, is from six to eight feet only.

Two different modes of improvement for these rapids might be adopted, and an estimate of both having been made, I have not hesitated in advising you to adopt the second. I shall give you a brief description of both, and refer you to a map of that portion of the river for a better understanding of those two plans.

The first was to build an embankment in the river the whole length of the rapids, so as to form a canal eighty feet in width, with a lock of 8.24 feet lift at its termination, and without the aid of a dam, obtain the depth of water required at the upper end of the canal by excavating a channel one and a half feet in the rock under the water, for a distance of eight hundred feet, between the embankment and the shore.

The second plan, which is the one I should consider advisable to adopt, is to build a dam as far down the rapids as the bottom of the river and the elevation of the north bank will admit.

The length of this dam will be from nine to ten hundred feet, and its elevation from the bottom of the stream will not exceed ten feet. A canal will be constructed from the dam to the foot of the rapids by an embankment made in the river about two thousand feet in length. The dam will be of sufficient height to raise the water eighteen inches at the head of the rapids, so as to get a sufficient depth of water at that place and avoid the rock excavation under water. This elevation added to the total fall of the rapids, 8.24 feet, will give 9.74 feet, the number of feet lift for the lock at the foot of the canal.

The cost of three-fourths of a mile of embankment, and of the rock excavation under water for a distance of eight hundred feet, for the completion of the first plan, will by far exceed the expense of a dam across the stream—the work would be more liable to damages by freshets and ice in the spring—and the water-power, which will afford a considerable revenue to the State, would be much less, and on one side of the river only.

From the Upper rapids to Rockford, a distance of sixty-three miles, the only obstructions in the river are three moveable sand bars, having, for a very short distance, a depth of water of from two and a half to three feet only. Those bars being formed of quick-sand, may be removed in

a short time by the frequent passage of steamboats. But with the aid of wing-dams, from one hundred and fifty to two hundred feet in length and three to four feet high, the channel can be easily cleared. The width of the river between the two places varies from six to eight hundred feet. The total fall is 69.91 feet, with an average velocity of current of three miles per hour.

Opposite Rockford, for a distance of eight hundred feet, the river is shallow, its deepest water being only two to two and a half feet; the velocity of the current, for that distance, varies from four to five miles per hour. The bed of the river is of solid and smooth rock.

By deepening the channel on the south side of the river and constructing a wing-dam on the opposite side, about two hundred feet in length and four feet in height, to maintain the water at the same level, this obstruction will be removed to the best advantage.

From Rockford to the mouth of the Peeketonokee, the river offers a good channel of no less than four and a half feet of water; its width is from four to five hundred feet, and the fall between the two places, distance twenty miles, is 28.61 feet. About three miles above Peeketonokee, near the foot of the Little island, which occupies the centre of the river, a large rock, measuring from forty to fifty cubic yards, obstructs the best channel, and will have to be removed. Half a mile farther, a wing-dam of one hundred and thirty feet in length, will have to be constructed to remove a sand bar which reduces the channel to two and a half feet water, for a distance of four hundred feet.

One mile from the State line the river varies from three to five hundred feet in width. Its sudden fall, at the rate of four feet per mile, creates a very strong current and a shallow channel from the mouth of Turtle river to a distance of about one thousand feet. On the south side of a large island is the main channel; by the aid of a dam, four feet in height, from the north shore to the island, we shall obtain a depth of water of four and a half feet, with a velocity of current of four and a half to five miles per hour; this will be easily overcome by steamboats.

From the mouth of the Peekenotokee to the State line, the distance is five miles and a half, and the total fall in the river is twelve feet; the velocity of the current averages about three and a half miles per hour. It was my intention to present you with a map of the whole river, with this report; but I have not been able to complete it entirely for want of time, having paid all my attention to prepare the Lower and Upper rapids for contract, according to your directions. This map will be submitted to your examination at the meeting of the Board next December.

The importance of improving the navigation of Rock river—the immense benefit that will be derived from it, as well for the State as for the country, are already known. Any traveller who views any part of this stream, is struck by its beauty—with the fertility of the soil in its vicinity—the general salubrity of the climate, and the rapid increase if its population.

Many flourishing towns are already progressing on Rock river that would now afford business of some importance to several steamboats; and at the rate the population has been increasing for the last two years, the amount of freight to supply the wants of the country will more than triple every year. There is a peculiar character to Rock river

which distinguishes it from most navigable streams in this country; it is generally confined within its banks, and in high floods it is never obstructed with flood wood, although the land, at its head waters, is well timbered, and will afford an abundant supply of lumber to the country below. In accordance with your instructions, the location of the work for the improvement of the two rapids was done this spring, with plans and specifications for the several portions of the work. For the improvement of the Lower rapids, the ground on Vandruff's island was the most favorable, affording material advantages for the location of the canal, which were seldom met with. The sinuosity of the bank admits of a straight line for the canal, which is 1,900 feet in length. A bay formed by the bend of the river protects the entry, and its termination connects with the deepest channel of the river. Its width, at the water line, will be eighty feet, and its depth five feet. The lock will be built of stone, with a chamber one hundred and forty by thirty-eight feet, and will admit the passage of boats of the common size running on the Upper Mississippi.

The dam is to be circular, built with crib-work, filled with stone, and supported by two natural stone buttresses, formed by high ledges of rock on each side of the river.

The works at the Upper rapids will be attended with some difficulty; but the locality affords materials to construct a solid and permanent work.

The canal will be formed by an embankment in the river, composed of earth and stone excavated from the bank.

The plans for the lock, guard-lock, and dam, are the same as for the Lower rapids.

Our specifications will give you a minute detail of the work, and the mode proposed for its construction.

Respectfully submitted.

Estimate for the complete improvement of Rock river, securing four feet water from the Mississippi to the State line, a distance of one hundred and sixty-five miles.

LOWER RAPIDS.

21,054 cubic yards of earth excavation, at 20 cents	-	\$4,210 80
1,061 cubic yards of rock excavation, at 1 dollar	-	1,061 00
759 yards of puddling, at 60 cents	-	455 40
Stone lock, \$4,747 23 per foot lift	-	35,604 26
Guard-lock	-	8,235 30
Circular dam, at \$15 52 per foot lineal	-	6,206 25
Dam No 2, at \$13 25 per foot lineal	-	2,463 68
Total	-	<u>\$58,236 69</u>

PROPHETSTOWN.

Wing-dam 160 feet long, at \$8 per foot lineal	-	\$1,280
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UPPER RAPIDS.

60,169 cubic yards embankment, at 20 cents	-	12,033 80
4,032 square yards slope-wall, at \$1 25	-	5,040 00
3,210 cubic yards rock excavation, at \$1	-	3,210 00
2,490 cubic yards earth excavation, at 16 cents	-	384 00
Stone lock, 9.74 feet lift, at \$4,105 97 per foot	-	39,992 16
Guard-lock	-	8,235 30
Circular dam, 1,109 feet long, at \$15 per lineal ft.	-	16,500 00
Total	-	<u>\$85,395 26</u>

FROM UPPER RAPIDS TO ROCKFORD.

Wing-dam 140 feet long, at \$6 per lineal foot	-	\$840 00
do. 110 feet long, at \$6 do. do.	-	666 00
do. 150 feet long, at \$6 do. do.	-	900 00
Total	-	<u>\$2,400 00</u>

ROCKFORD RAPIDS.

1,500 cubic yds. of rock excavation under water, at \$2	-	\$3,000 00
Wing-dam 450 feet long, at \$7 per lineal foot	-	-3,150 00
Total	-	<u>\$6,150 00</u>

FROM ROCKFORD TO THE STATE LINE.

50 cubic yards of rock excavation under water, at \$2 50	-	125 00
Wing-dam 130 feet long, at \$6 per lineal foot	-	780 00
do. 160 feet long, at same price	-	960 00
Total	-	<u>\$1,865 00</u>

SUMMARY ESTIMATE.

Lower rapids,	-	\$58,236 69
Prophet's village,	-	1,280 00
Upper rapids,	-	85,295 00
From Upper rapids to Rockford,	-	2,400 00
Rockford rapids	-	6,150 00
From Rockford to the State line,	-	1,865 00
Aggregate amount,	-	<u>\$155,226 95</u>
Add 15 per cent. for engineering and contingencies	-	23,321 54
Whole total	-	<u>\$178,548 49</u>

Distance in miles.	Fall per mile.	Velocity, in miles, per hour.	Soundings.					Distance requiring improvement.	Mode of improvement.	
			Maximum.	Length.	Medium.	Length.	Minimum.			Length.
<i>From mouth Rock river to Lower rapids</i>	6.51 .68	7½ 3	10.00 9.00	92,932 140,760	3.00 6.50	1,000 1,400	3.00 5.00	200 1,800	Canal, dam and lock. Dam.	
<i>Prophet's town</i>	8.42	7½	9.50	154,355	3.50	4,300	2.00	1,300	Dam and lock or canal.	
<i>Upper rapids</i>	.98	2½	9.50	40,306	7.00	21,314	5.00	1,000		
<i>Dixons</i>	1.38 1.70	3 3½	40.50 6.00	400 48,624	6.50 3.50	69,529 1,180	4.00 3.00	400 3,600	Dam.	
<i>Oregon</i>	1.24 1.39 1.75	2½ 2½ 2½	7.50 6.00 6.50	23,215 37,656 30,512	6.00 5.00 5.50	28,191 2,200 2,600	4.00 3.00 3.00	1,400 800 600	Dam. Dam. Dam.	
<i>Rockford</i>	2.22 1.31	3½ 2½	7.00 8.00	7,070 32,110	2.50 5.25	350 15,410	2.00 4.00	400 50	Rock exca'n & dam.	
<i>Pesticonoicc</i>	2.60 3.98 4.02	2½ 3 4½	5.00 6.00 7.00	8,200 5,600 1,400	5.00 4.50 5.00	4,200 4,560 3,380	3.50 2.50 2.50	800 400 600	Dam. Dam. Dam.	
<i>State line</i>	164.50									

Total fall of Rock river within the State, 191 feet.

EXHIBIT No. VII.

REPORT OF EBENEZER PECK,

WITH ACCOMPANYING DOCUMENTS.

VANDALIA, Dec. 13, 1838.

To the PRESIDENT
of the Board of Public Works.

Since the June meeting of the Board, the twenty-two miles of the Central railroad in the seventh judicial circuit, previously ordered to be put under contract, have been let, and are rapidly advancing towards completion.

The contracts were for the most part let to efficient men, and at fair prices, and will be completed (except the superstructure) by September next. The contract prices for grading, masonry, &c., as also the quantity of work done can be readily ascertained by reference to the tables accompanying the reports of the principal engineer of the northern district, and the assistant engineer upon the line.

A survey of the upper part of the navigable portion of the Illinois river has been effected, as will be seen by reference to the report of T. B. Ransom, assistant engineer, whose skill and capacity eminently qualify him for the performance of this duty, and to impart the necessary information in connection with this important branch of our labours. By reference to the report of Mr. Ransom filed herewith, full information can be had upon this subject. I would recommend that the improvements upon the Illinois and Rock rivers be placed under the separate control of an engineer.

The connection of the Central railroad with the Illinois river, at the termination of the Illinois and Michigan canal, it will be perceived by reference to the map produced with this report, is upon State land, and has been fixed with a direct view of increasing the value of the State property at this important position. I do not think that I can be charged with exaggeration when I express an opinion that the benefits to be received by the State, by the increased value of the lands at the town of La Salle, will more than overbalance the whole expense of constructing the twenty-two miles of road now under contract at that point.

Should the Board of Canal Commissioners think it expedient, a levee might be raised along the bank of the Illinois river from the termination of the railroad on the south side of the river, extending upwards to the highlands, which would redeem upwards of three hundred acres of valuable land from inundation, and greatly increase its value, at a comparatively small expense. Should this plan be ultimately adopted, the grade of the road across the Illinois bottom at this point might be lowered, and the cost of the road diminished.

It is proper to mention that, as the law directed the roads to be commenced at the navigable streams, and to be worked each way from them, the cost of construction of the roads now under contract will greatly exceed the average cost of the whole line of road to be constructed. This remark applies with peculiar force to that portion of the road placed under contract in my circuit.

The bluffs of the Illinois river are quite bold and difficult of ascent, and the obstruction can only be overcome, on the south side, by ascending through the valley of a creek. By much pains, though at considerable expense, a favorable route has been found, and this difficulty surmounted. The expense of preparing the road for the superstructure is comparatively small. It is believed that the estimate of the cost of the Central railroad, by the Legislature, as far as the northern portion of it is concerned, will be adequate for its completion; some portion of the road under my supervision has already been graded, and made ready for the superstructure, at a cost less than five hundred dollars a mile.

I have received of the public funds since my appointment as Commissioner	-	-	-	-	-	\$38,071	67
Out of which sum I have expended upon the Central railroad	-	-	-	-	\$37,091	31	
Upon the Quincy and Meredosia road	-	-	-	-		545,00	
For survey of Illinois river	-	-	-	-		201,02	
							<u>37,837 33</u>
The small balance of	-	-	-	-	-		<u>234 34</u>

remaining in my hands is insufficient to cover moneys actually expended by me, for which I have unformal vouchers, and to cover some unliquidated accounts contracted by me for the public works; which I shall be able in a few days to adjust with the State.

The reports of the principal and assistant engineers accompanying this will furnish full, and, I trust, satisfactory details of the business of the seventh circuit entrusted to my charge.

It is to be hoped that neither the malevolence of party, the pride of opinion, the bitterness of personal enmity, or any unfortunate spirit of demagoguism, will be permitted to triumph over the public good, so far as to interrupt the onward march of our State in her internal improvements; the good fruits of which are already perceived in the sales of her produce, in the advanced price of her estates, and, above all, by a large accession of enterprising and intelligent population. The advantages of these can not be lessened by any carpings about the price of chickens, or the ambitious aspirations of lovers of office.

E. PECK.

JUNE 25, 1838.

TO E. PECK, Esq.

Commissioner of Public Works, Seventh Judicial Circuit.

SIR: Agreeably to your instructions, I have located, and prepared for contract, twenty-two miles of the Central railroad; and in compliance with the 12th article of the internal improvement act, I have the honor of laying before you the following report upon the same, accompanied with all the necessary maps, profiles, plans and estimates.

In locating and preparing for contract that portion of the Central railroad extending eleven miles each way from the Illinois river, which was ordered to be put under contract by the Board of Public Works at their meeting in December last, I first directed my operations upon the north side of the river. I had previously ascertained that by far the most favorable point for crossing the river was a short distance below the termination of the Michigan canal; and I deemed it a matter of importance that the termination of the line or depot should be located so as to secure a ready access to this point, whereon appropriations should be made for continuing the line of road across the river. Two locations have presented themselves, which seem equally to secure the above object, to wit, the one on the bottom, and the other on the bluff. The advantages and disadvantages of each of these locations were carefully considered, and the facilities of gaining a road-way from either to the prairie were thoroughly and accurately examined. In the result, many weighty reasons were found in favor of a location on the bluff. I have therefore commenced the line on section 15 (State property) about 500 feet from the steamboat basin. From this point the river can be approached on an inclination of less than sixty feet per mile. A railway can be extended, at a small expense, to any point on the basin, whenever increase of business shall suggest such a facility for the transfer of freight.* From this point the road is located in Broad street for a distance of 1,600 feet. It then becomes necessary, to conform to the direction of a ravine up which the line passes, to deflect on a curve of 5,750 feet radius. After gaining the high prairie, the line again deflects on the same radius. For the purpose of curving into a tangent, the line is continuous to the end of the location.

The first two sections contain some heavy cutting, and, for a distance of three thousand feet, a grade of 95 feet to the mile. But as the heavy transportation will naturally be towards the river and canal, this grade for so short a distance cannot be considered as being very objectionable. From the commencement of section three, the line passes over a smooth undulating prairie, with easy grade and little excavation or embankment until reaching Spring creek. There a bridge 30 feet span will be necessary; stone abutments and truss frame are recommended. From this onward, the country over which the line passes is again high and rolling; four culverts only will be required in the whole distance, and those are proposed to be simple box culverts of dry stone masonry. Turn-

* The location through La Salle has been so improved as to give but one curve.

outs, road-crossings, watering stations, &c., can all be located to very good advantage. Building materials must be conveyed from the river and bluffs, where good and suitable stone for masonry are easily obtained. A superior quality of timber for superstructure and other wood work can be obtained from neighboring groves, and at a distance of not exceeding ten or twelve miles.

For the topographical features of the country through which the line passes, and a more definite idea of the location, I would refer you to the accompanying maps and profiles. (See maps, &c.)

On account of high waters, the operations were not commenced on the south side of the river until late in April, when a party was organized and put under the immediate charge of Gen. T. B. Ransom. The route of the line lay up the valley of Cedar creek, and was well defined; but, on account of a variety of circumstances and considerations, the location has been tedious and very difficult. A good line, however, has been obtained; for a description of which I am happy to refer you to the accompanying communication I have received from Mr. Ransom. (See Ransom's reports and accompanying maps, plans, profiles, &c.)

In conclusion, I will remark that the valley of the Illinois river is about 200 feet below the high prairie, and is generally bounded by abrupt bluffs of from 70 to 120 feet in height; hence the great difficulties to be overcome, and disproportionate expense of the first few miles from the river. The prairie once gained, and all difficulties vanish, and the expense of graduation becomes comparatively trifling.

Most respectfully submitted.

H. P. WOODWORTH, *Engineer.*

Table of Grades and Distances for eleven miles of the Central Railroad, from the Illinois river north.

Location.	Stations.		Distance from La Salle.	Length of each grade.	Ascent per mile.	Descent per mile.
	From	to				
Commencing on edge of bluff, La Salle	0	5	<i>Feet.</i> 500	<i>Feet.</i> 500	Level	
On prairie	5	64	6,400	5,900	104.504	
Do.	64	78	7,800	1,400	11.088	
Do.	78	135	13,500	5,700	9.504	
Do.	135	235	20,500	10,000	1.637	
Do.	235	326	32,600	9,100	9.134	
Do.	326	355	35,500	2,900	-	15.787
Do.	355	360	36,000	500	Level	
Do.	360	385	38,500	2,500	31.938	
Do.	385	420	42,000	3,500	22.890	
Do.	420	440	44,000	2,000	-	.159
Do.	440	495	49,500	5,500	16.896	
Do.	495	581	58,080	8,580	12.145	

Table of Curves, Tangents, and Elevations.

Location.	Stations.		Distance from La Salle.	Length of particular curve or tangent.	Tangent or curve.	Radii.	Distance above.
	From	to					
Commencing at La Salle	0	77	<i>Feet.</i> 7,700	<i>Feet.</i> 7,700	Tangent		
On prairie	77	105	10,500	2,800	Curve	5,804	120.47
Do.	105	581	58,080	47,580	Tangent	-	125.86
			or 11 m ² s	-	"	-	208.22

Report of T. B. Ransom.

ENCAMPMENT, No. 1,

Cedar Creek, June 25, 1838.

To H. P. WOODWORTH,

Chief Engineer of Northern Engineering District.

SIR: In accordance with your request of June 18, I herewith present the result of my field examinations and location of the Central railroad, from the Illinois river, opposite La Salle, through the valley of Cedar creek, to a point on the Grand prairie, near Walnut grove, embracing a distance of eleven miles. Maps, profiles, and estimates of the located line, also accompany these remarks.

In consequence of the backwardness of the season, and the unusually high floods of the Illinois river and Cedar creek, our operations in the field have necessarily been much retarded; though it is, perhaps, fortunate for the interests of the State that the unusual rise of these waters occurred at this time, since they have probably made known the extent of the evils we have to guard against.

GENERAL FEATURES.

The Illinois bottom, over which our line passes for nearly one mile and a half, is a rich, compact, vegetable alluvion, of many feet in depth, underlaid, and running into a formation of clay and sand as we approach the bluff. During high floods, this bottom is not unfrequently submerged to a depth of ten feet.

The first mile from the river is over a beautiful open meadow; the remaining distance on the bottom, as well as the slope of the bluff, is covered with a heavy growth of valuable timber.

Cedar creek empties itself into an arm of the Illinois, amid this timber, about one-half of a mile from its gorge in the bluff. It is a small stream, though subject, at times, to very high floods; its valley is a deep cut-off, from one to two hundred feet, into the edge of the prairie, exceedingly serpentine and rugged, and varying from 200 to 500 feet in breadth. Bold bluffs and ridges of more than 100 feet in elevation interlock in some places along the valley, while the stream winds around their bases.

These bluffs are subject to heavy "slides;" their geological formation, therefore, is easily determined; their tops have usually a thin soil, running into sand and clay, to a depth of from 10 to 20 feet; we then come to strata of limestone, and partially cemented clay, alternating. The strata of stone vary from 1½ to 3 feet in thickness, with numerous vertical cross seams; and the lower stratum, in particular, will be very valuable, convenient, and, I doubt not, sufficiently abundant for the structure of the necessary bridges and culverts along the road already located, though it is believed that the grade line will not fall below the second stratum.

Strata of bituminous coal of an excellent quality are also found at several points along this valley; this will also be of some importance to the interests of the State, whenever the road is completed.

As we ascend the valley, the bluffs on either side become less bold and irregular; and above Manvill's mills, the stone formation entirely disappears. A variety of excellent timber, suitable for the superstructure of the road, is found along the creek for about four miles from its mouth; at which distance we arrive at the prairie, the topography of which is well known. Here the creek separates into smaller streams, with gradually sloping banks, their beds being but slightly depressed below the general level of the prairie, which, at a distance of five miles from the Illinois, is 232 feet above its surface at low water.

From the head waters of these streams, an even unbroken prairie extends for many miles beyond the limit to which our prescribed distance of 11 miles will carry us.

PARTICULAR LOCATION OF LINE.

The line commences on the south bank of the Illinois river, opposite to the termination of the Michigan and Illinois canal, and runs, in the best direction attainable, for the gorge of Cedar creek at the bluff. In order to be secure against the floods of the river, and also to ease the grade in ascending along the curve in the valley of the creek, a very heavy embankment is necessary across the bottom of the Illinois.

Observation has shown that, during the floods of the river, large trees, ice, &c., are carried with much force over this bottom. With a view to protect the embankment from the action of these masses, I would suggest that an embankment be constructed along the immediate bank of the river, from the point where the railroad line strikes the river to the bluff, a distance of about a mile, and along the highest ground upon the bottom. A large portion of this meadow would thus be secured against the floods, and consequently very much enhanced in value. As this point, from its local situation and other circumstances, cannot fail of being one of much importance, I cannot but believe that the State will be amply compensated for the extra expense of the work above noticed, by the greatly enhanced value of the State lands upon which they will thus be constructed.

The railroad embankment, thus protected, may also safely be of less elevation and strength than would otherwise be admissible. A superstructure secured upon piles would, however, save much of the immediate expense.

Before making the bluff, the line crosses Cedar creek about 80 feet from its entrance into the arm of the Illinois, and recrosses it again 2,100 feet from the former point. Bridges of about 80 feet span each, with expensive abutments, would be necessary to pass these points. But I would propose to make a cut of about 200 feet, by means of which the creek can be turned into the river below its present mouth, and thus save the expense of these works.

After leaving the embankment on the Illinois bottom, three heavy bluffs are encountered on a curve of 2,729 feet radius; the two first of which are on the east, and the other on the west bank of the creek.

The heavy embankment along the bottom will require much more earth than the amount of excavation which these bluffs will afford, with the slopes allowed on other parts of the work; their slopes can, therefore,

be so much reduced by taking the excess of bank from them, that no danger need be apprehended from slides upon the road, that otherwise could not be well avoided.

For the grades, curves, culverts, and bridges, I would refer you to the tables herewith presented, as well as for the estimates upon different parts of the work.

After passing the third bluff, it will be seen by reference to the profile and map, that from that point to Manvill's mills, three high bridges, with rather heavy embankments, are required. The grade line along this portion of the road might have been laid somewhat lower, and thus have saved expense, but for the necessity of continuing the grade below, in order to reach the edge of the plane at the latter place, which is already cut as deep as is considered safe, on account of rock excavation.

The line passes the creek at bridges, Nos. 1, 2, and 3, very favorably, and the location of bridge No. 4, would have been much improved by throwing the tangent on which it is placed further to the north; but this would have injured the location of bridge No. 3, and very much increased the amount of embankment; as it is situated, the creek must be turned for a short distance, to be passed in a more favorable manner, and a slope wall, of about 170 feet in length, will be requisite.

The next point of any considerable importance is at bridge No. 5, which, however, spans the creek at a very favorable point, and will be less expensive than either of the preceding ones. The deep cut through the ridge, near bridge No. 5, is resorted to, in order (as will be seen by reference to the map) to save excessive embankment and enlarge the radius of the curve at that point.

The line passes and repasses the creek again, near stations 193 and 198, respectively; but bridges at these points will be obviated by making a short cut of about 280 feet in length, and about 20 in depth, by means of which the creek may be turned through the ridge, on the east of the line, and thus save the expense of two bridges at these points. It should be remarked, also, that the ridge above mentioned is a formation of sand and clay easily excavated.

The only points of importance on the remaining part of the line, are the cut, bridge No. 6, and the embankment at or near Richey's. If the line be placed further east, to avoid the deep cut just noticed, a much longer and heavier embankment in the valley will be necessary than is requisite on the present line, as well as a re-curve to gain the proper direction.

The high bridge and embankment are necessary in order to maintain the elevation already attained and pass on to the prairie with an admissible grade.

After leaving this embankment, we strike the open prairie, and leave the valley of Cedar creek and its branches to the right. From this point the line traverses an almost level prairie, without an obstacle worthy of notice, to its southern limit.

It will be seen that the first six sections contemplate a variety of heavy and expensive work; yet, considering the height to which the floods rise on the Illinois bottom, and the consequent necessary height of the embankment that traverses it—the winding and rugged character of Cedar creek valley—and the great elevation to be overcome in a

short distance, I cannot but believe that the grades and curves of the proposed line are as favorable, and the aggregate expense of the whole as light as could have been anticipated under these circumstances. Indeed, it will be seen that the elevation of the prairie is attained upon grades and curves that admit of motive power, as the agent, without diminishing, in any considerable degree, the velocity or weight of the bodies to be transported.

I regret that time does not permit me to present more finished maps and drawings, as well as a more perfect exposition of the topography of the country, and the various works required along the located line; but as you are well aware of this fact, the above remarks are respectfully submitted, without further comment, by

T. B. RANSOM.

Table of Curves, Tangents, and Elevations.

Location.	Station.		Whole distance from Illinois river.	Length of particular curve or tangent.	Tangent or curve.	Radii.	Distance above or below high water in Illinois river.	
	From	to					Above.	Below.
Commencing at Ill. river	0	25	<i>Feet.</i> 2,500	<i>Feet.</i> 2,500	Tangent	-	-	11.94
On bottom	25	45	4,500	2,000	Curve	7,640	-	11.90
Mouth of Cedar creek	45	54	5,400	900	Tangent	-	-	10.42
On timber bottom	54	112	11,200	5,800	Curve	27.29	67.00	10.42
On Point Bluff	112	134	13,400	2,200	Tangent	-	95.05	
Near Manvill's	134	190	19,000	5,600	Curve	2,645	135.42	
On bank of creek	190	193	19,300	300	Tangent	-	129.08	
On bank of creek	193	210	21,000	1,700	Curve	3,970	179.57	
On high ground	210	236	23,600	2,600	Tangent	-	153.56	
Near Richey's	236	282	28,200	4,600	Curve	55.45	211.10	
On prairie, 100 ft. from com't	282	430	43,000	14,800	Tangent	-	223.44	
Opposite Binbuy's Point	430	502	50,200	7,200	Curve	20,304	221.92	
On prairie	502	580	58,000	7,800	Tangent	-	235.90	

Table of Grades and Distances.

Location.	No. of grade.	Station.		Whole distance from Illinois river.	Length of each grade.	Ascent per mile.	Descent per mile.
		From	to				
Commencing at Illinois river	1	0	50	<i>Feet.</i> 5,000	<i>Feet.</i> 5,000	Level.	
Near Manville	2	50	150	15,000	10,000	53.93	
On prairie, 1,000 ft. from timb.	3	150	265	26,500	11,500	41.707	
On prairie	4	265	310	31,000	4,500	12.82	
On prairie	5	310	430	43,000	12,000	3.66	
On prairie	6	430	475	47,500	4,000	-	18.45
On prairie	7	475	500	50,000	2,500	31.908	
On prairie	8	500	581	58,080	8,080	8.308	

Estimates of the probable expense of the grading and masonry on 11 miles of the Central Railroad south of the Illinois river.

SECTION 1.

63,575.65	cubic yards embankment, at 30 cents per yard	\$19,072 50
4,444	cubic yards protection wall, at \$1 50	6,666 00
		<u>25,738 50</u>

SECTION 2.

6.43	acres clearing and grubbing, at \$30 per acre	\$192 90
125,482	cubic yards embankment, at 25 cents	- 31,370 50
8,963.54	cubic yards excavation, at 16 cents	- 1,434 16
150	cubic yards masonry, at \$5	- 750 00
	For turning channel of Cedar creek	- 150 00
		<u>33,879 56</u>

SECTION 3.

5.5	acres clearing and grubbing, at \$25	- \$137 50
58,630.94	cubic yards excavation, at 20 cents	- 11,726 18
87,757.83	cubic yards embankment, at 16 cents	- 14,041 25
1,528	cubic yards masonry, at \$6	- 9,168 00
100	cubic yards masonry, in culvert, at \$5	- 500 00
33	cubic yards slope wall, at \$1 50	- 49 50
		<u>35,622 43</u>

SECTION 4.

3.12	acres clearing and grubbing, at \$20	- \$62 40
8,637	cubic yards excavation, at 20 cents	- 1,727 40
11,901	cubic yards embankment, at 14 cents	- 1,666 14
1,511	cubic yards masonry, at \$6	- 9,066 00
62	cubic yards slope wall, at \$3	- 186 00
		<u>12,707 94</u>

SECTION 5.

2.5	acres clearing and grubbing, at \$20	- \$50 00
19,262	cubic yards excavation, at 14 cents	- 2,696 68
16,141	cubic yards embankment, at 16 cents	- 2,582 40
38	cubic yards masonry in culverts, at \$5	- 190 00
		<u>5,519 08</u>

SECTION 6.

7	acres clearing and grubbing, at \$20	-	\$140 00
43,480	cubic yards excavation, at 16 cents	-	6,956 80
16,324	cubic yards embankment, at 16 cents	-	2,611 84
550	cubic yards masonry, at \$6	-	3,300 00
			<u>13,008 64</u>

SECTION 7.

1,263	cubic yards excavation, at 16 cents	-	202 08
2,526	cubic yards embankment, at 16 cents	-	404 16
			<u>606 24</u>

SECTION 8.

1,732	cubic yards excavation, at 16	-	\$277 12
6,808	cubic yards embankment, at 16 cents	-	1,089 28
73	cubic yards masonry, at \$6	-	438 00
			<u>1,804 40</u>

SECTION 9.

87	cubic yards excavation, at 14 cents	-	\$12 18
11,926	cubic yards embankment, at 14 cents	-	1,669 64
50	cubic yards masonry, in culvert, at \$7	-	350 00
			<u>2,031 82</u>

SECTION 10.

79	cubic yards excavation, at 14 cents	-	\$11 06
3,499	cubic yards embankment, at 14 cents	-	489 68
			<u>500 92</u>

SECTION 11.

1,058	cubic yards excavation, at 14 cents	-	\$148 12
3,154	cubic yards embankment, at 14 cents	-	441 56
			<u>589 68</u>

SECTION 12.

1,356	cubic yards excavation, at 14 cents	-	\$189 84
3,917	cubic yards embankment, at 14 cents	-	548 38
			<u>738 22</u>

SECTION 13.

660	cubic yards excavation, at 14 cents	-	\$92 40
3,277	cubic yards embankment, at 14 cents	-	458 78
			<u>551 18</u>

SECTION 14.

22,764	cubic yards embankment, at 14 cents	-	\$3,186 96
70	cubic yards masonry, at \$7	-	490 00
			<u>3,676 96</u>

SECTION 14½

26	cubic yards excavation, at 14 cents	-	\$3 64
3,743	cubic yards embankment, at 14 cents	-	524 02
			<u>527 66</u>
Total cost of sections	-	-	\$137,523 23
Add for 76 yards masonry on section 12, at \$7	-	-	532 00
For 40 yards protection wall on section 4, at \$1 50	-	-	60 00
For turning channel of Cedar creek on section 5, to save two bridges	-	-	250 00
For drains and ditches	-	-	400 00
Total for grading 11 miles of railroad	-	-	<u>138,765 23</u>
Add 10 per cent for contingent expenses	-	-	13,876 52
Total cost	-	-	<u>\$152,641 75</u>
Average cost per mile	-	-	<u>\$13,876 22</u>

The above estimate is believed to be sufficiently liberal to cover the expense of bridge and culvert pits, as well as all necessary drains and ditches.

Respectfully submitted, by

T. B. RANSOM, *Engineer.*

Report of T. B. Reansom.

RAILROAD OFFICE,

La Salle, Nov. 25, 1838.

TO E. PECK, Esq.

Commissioner of the Board of Public Works.

SIR: The following summary remarks, descriptive of the commencement of and progress in grading the twenty-two miles of the Central railroad put under contract, at La Salle, on the 25th June last, with the other papers herewith presented, it is believed will be sufficient to exhibit all of the important facts connected with the operations on the public works at this place.

Within thirty days after the contracts were executed (for grading) the work was commenced in a suitable manner upon each contract along the line; but owing to the unusual degree of sickness of this season, and the consequent difficulty, if not impossibility, of procuring and keeping a requisite number of hands, its progress has been very much retarded; so much so that, upon the heavy jobs, there are good reasons to doubt the ability of the contractors to complete their work within the time specified in their agreement with the State.

The work is divided into sections of four thousand feet each, and numbered from the Illinois river each way.

The eleven miles upon the north side of the river was put under the immediate charge of H. K. Curtis, Esq., and the same extent of road on the south side under the immediate charge of C. D. Woodworth, Esq.; both of whom (as well as the young gentlemen generally who have composed these parties,) I take great pleasure in stating, have discharged their respective duties in a manner creditable to themselves, and beneficial to the interest of the State.

Messrs. Kenedy and Brookin's job, embracing sections Nos. 1 and 2 on the north side of the river, and section 7 on south side, has been commenced on section 1, which is now in progress. In the deep cut on this section, (requisite in ascending to the prairie from La Salle city,) at a distance of about three feet under the surface, the material is found to be mostly a semi-formed argillaceous slate in their horizontal strata, and very tenacious; this same formation is also found on the opposite side of the river at the same elevation; It is therefore probable that it underlays the country to a very considerable extent. A stratum of iron ore has also been discovered near the surface on this section, varying in value probably from 30 to 70 per cent; and as the earth will doubtless be graded here below the stratum in building the city, it may ultimately be of some importance to the State.

One or two strata of bituminous coal have also been found here, and on the opposite side of the river, though, so far as they have been traced, they are of inconsiderable value. Mr. Bigalow's job, which embraces the sections from 2 to 14 $\frac{1}{2}$ inclusive on the south side, has been commenced and executed so far in a very neat and workmanlike manner. The industry which has here characterised his work gives promise that it may be completed within the time specified in his contract. Sections

2, 4, 5 and 6 are completed, as well as the culverts on sections 4, 5 and 6. Several other sections embraced in his contract are also well advanced. From the work already done, it will be seen that the expense of grading the prairie sections does not differ materially from the original estimate.

I ought not disguise my belief that the ditches for the excavated part of the work will be found insufficient, especially as the grade line in some places is so much below the general level of the prairie; for if the superstructure comes at or near the surface, upon whatsoever plan it may be constructed, it will be necessary to have the road-bed well drained.

Sections 1, 2, 8, and 9, on the south side of the river, are under contract to Cronkhite and Doolittle; of which section 2 is chopped, and the grading commenced at the point where the embankment crossing the Illinois bottom strikes the bluff.

Although the strata and different substances which compose these bluffs are such as stated in my former communication, it is found that the deeper they are penetrated, the more firm and solid they become; and, of course, the difficulty and expense of the excavation will be enhanced in the same proportion; indeed, some of these strata have all the hardness and tenacity of solid rock; this will necessarily increase the expense of grading at these points, and probably bring the aggregate expense somewhat above the estimate of last spring.

The grade line across the Illinois bottom was laid under the expectation that an embankment would be thrown up along the bank of the river from the termination of the railroad embankment to the bluff; thus securing several hundred acres of very valuable land from the action of the floods. If this is not done, the railroad embankment will require to be at least two feet higher than was then contemplated, and a broad water-way be left at some appropriate place, to prevent the damaging and accumulation of water during floods, which it must be seen will be caused by the canal and railroad embankments; which, as they extend to the bluffs on either side of the river, will operate to raise the floods on the upper side of these embankments, where formerly they swept freely over this broad span, to the height of at least ten feet, and force them with an increased velocity along the main channel of the river, and through such other passages as may be left open to their course.

It will be seen also by reference to the maps, that the railroad line being a little below, and making out a small angle with the embankment of the steamboat basin, or termination of the canal; and the channel of the river turning to the right in passing down between them, the floods will necessarily throw floating ice, trees, &c., directly upon the railroad embankment, which would be prevented by a bank along the south side of the river; this bank would also gradually turn the current above in a direction to pass around the termination of the railroad line.

A proper security to this point by means of piles and slope wall will be requisite. Instead of the latter, however, to protect the embankment along the bottoms, should the plan of constructing one along the river be abandoned, I would propose that small brush in suitable quantities be interwoven with each other and embedded in horizontal strata in the embankment while it is being constructed, and that the slopes be further protected by planting upon them in fall or spring the Bermuda grass,

or the common turf of the prairie. I have known this kind of embankment to resist the action of water, ice, &c. better than the ordinary slope wall; and the expense of this kind of protection is evidently much less than the former.

Sections 3, 4, 5, and 6, have been commenced in a very efficient manner by Perry, Wilson & Co. The third section has three bridges and the deepest cuttings on the work. The remarks made in reference to the material to be excavated on section 2 will also apply to the material in the deep cuts in the bluffs on this section. Between this point and the prairie, as the grade ascends rapidly, it is believed that no material will be found so difficult to remove as that encountered in the several strata below.

Stone of the first quality for the bridge abutments, and of any desirable dimensions, is found here in the most advantageous situations for these works; all such as are valuable for building purposes, and not required in the work, are reserved along the line, to be disposed of as the interests of the State may require.

The abutments of bridge No. 1 are well advanced, one being nearly completed. It is but justice to the contractors engaged upon these sections to remark that their masonry, thus far, will compare in neatness and stability with any work of the kind in the country. To one unacquainted with the high floods of Cedar creek, the dimensions of the bridges proposed for the railroad, and the character of the abutments in progress along its valley, would doubtless appear to be a worse than useless expenditure of public money. But when it is known that although its bed may even be dry in summer, yet the volume of its water in the spring and fall is not unfrequently equal to the ordinary volume of the Illinois river, and that it falls more than 200 feet in a distance of four miles, bringing along stones, gravel, trees, &c. the necessity of permanent works, and a liberal water-way, will doubtless become apparent.

It is true that the work on the first four and a half miles from the river is bold and expensive; and in consequence of the unexpected character of the material found in penetrating the bluffs, the estimated expense will be somewhat enhanced; still, when it is considered that an elevation of more than 200 feet is overcome in that distance without the aid of stationary power, in a good direction, with grades not exceeding 53 feet per mile, and upon curves of a liberal radius, I cannot but believe that this obstacle will be considered overcome as facile, and at an expense full as moderate as could have been anticipated.

I ought not to omit to mention here my belief that a suitable boat, with a railroad track along its deck to suit the work, and proper appendages at the terminations of the embankments on either side of the river to accommodate the rise and fall of the water, can be arranged and completed at a small expense, so as to carry a train of cars across the river with very little delay and in perfect safety.

In this event, and I doubt not in any event, works analagous to those now in progress on the south side of the river for ascending from the bottom to the prairie, will not only be very desirable on the north side also, but indispensably necessary.

A synopsis of the work already done, and to be done, on this part of the Central railroad is herewith presented.

Respectfully.

T. B. RANSOM.

SYNOPSIS of work done on eleven miles of the Central Railroad from the Illinois river south, up to the 1st December, 1888.

No. of sections.	Clearing and grubbing.	Cubic yards common earth excavation.	Price per yard.	Amount.	Cubic yards cemented clay excavation.	Price per yard.	Amount.	Cubic yards solid rock excavation.	Price per yard.	Amount.	Cubic yards quarried rock excavation.	Price per yard.	Amount.	Cubic yards rough masonry.	Price per yard.	Amount.	
2	\$180 00	1,657.4	16	\$265 18	1,764.2	40	\$705 70	168.89	\$1 25	\$211 11	186.91	75	\$219 55	-	-	-	
3	31 25	5,205.6	16	832 90	4,051.4	35	1,417 99	203.65	1 12 ⁴	229 10	591.04	62 ⁴	369 62	102.73	\$4 00	\$212 92	
6	150 00	525.	19	99 75	-	-	-	-	-	-	-	-	-	73.17	8 00	585 32	
8	Prairie	7,834.3	14	1,096 81	702.4	30	270 01	-	-	-	-	-	-	-	-	-	
	\$361 25	-	-	\$2,294 64	-	-	\$2,293 70	-	-	-	-	-	\$440 21	-	-	\$589 17	
																	\$798 24

SYNOPSIS—Continued.

No. of sections.	Cubic yards dressed masonry.	Price per yard.	Amount.	Cubic yards car-rying, per 100 feet.	Price per yard.	Amount.	Miscellaneous Expenses.	Amount.	Total amount.	Discount reserved.	Total amount.
2	-	-	-	3080.4	5	\$154 02	For turning channel into Cedar creek	\$138 07	\$1,873 63	\$284 12	\$1,589 51
3	473.39	\$5 25	\$2,485 26	2412.4	2	48 21	For excavation abutment and culvert pits	369 17	5,965 20	894 78	5,070 42
6	-	-	-	-	-	-	Ditch from culvert, 14.04 cubic yards	-	249 75	37 46	212 29
8	-	-	-	-	-	-	-	1 96	1,954 10	323 27	1,630 83
			\$2,485 26			\$202 26		\$509 20	\$10,042 68	\$1,539 63	\$8,503 05

SYNOPSIS of work to be done on eleven miles of the Central Railroad, from the Illinois river south.

No. of section.	Grubbing and clearing.	Cubic yards excavation.	Price.	Amount.	Cubic yards embankment.	Price.	Amount.	Cubic yards rough ma-sonry.	Price.	Amount.	Cubic yards dressed ma-sonry.	Price.	Amount.	Total amount.	Remarks.
1	-	63,575.65	18	\$11,443 61	*	-	-	-	-	-	-	-	\$11,443 61		
2	\$70 00	130,668.3	16	20,906 92	-	-	150	\$5 00	-	\$750 00	-	-	21,656 92		
3	218 75	136,336.70	16	21,813 87	-	-	-	-	-	-	22,766	\$5 25	\$11,952 20		
4	75 00	20,538.8	16	3,286 26	-	-	-	-	-	-	921	5 75	4,295 75		
5	300 00	35,402.9	17	6,018 49	-	-	75	4 50	-	337 50	-	-	6,355 99		
6	150 00	59,279.5	19	11,263 10	-	-	40	4 50	-	180 00	700	6 25	4,375 00		
7	Prairie.	3,789.7	16	606 35	-	-	-	-	-	-	-	-	-	15,818 10	
9	"	12,013.6	14	1,681 90	-	-	50	8 00	-	400 00	-	-	-	2,081 90	
10	"	79.33	14	111 06	3,438.9	14	\$489 50	-	-	-	-	-	-	600 56	
11	"	1,058.1	14	148 13	3,154.7	14	441 65	-	-	-	-	-	-	589 78	
12	"	10,356.3	14	1,449 88	2,917.2	14	548 41	76	6 00	456 00	-	-	-	2,454 29	
13	"	660.	14	92 40	3,277.3	14	458 82	-	-	-	-	-	-	551 22	
14	"	-	-	-	2,764.	14	3,186 96	70	6 00	420 00	-	-	-	3,606 96	
14½	"	26,063.14	-	3 64	3,743.6	14	524 10	-	-	-	-	-	-	250 00	Creek channel.
	\$813 75	-	-	\$78,825 55	-	-	\$5,649 44	-	-	\$2,543 50	-	-	\$20,622 95	\$108,111 29	

*All bids from section 1 to 10 are for excavation and carrying earth.

For turning channel to Cedar creek, \$250.

SYNOPSIS of work to be done on the eleven miles of the Central Railroad, from the Illinois north, December 1, 1888.

No. of section.	Cubic yards exca-vation.	Price.	Amount.	Cubic yards em-bankment.	Price.	Amount.	Cubic yards dry masonry.	Price.	Amount.	Total amount.	15 per cent. dis-count.	Total amount paid.
1	159,004.6	20	\$31,800 92	748.5	20	\$149 70	40	\$3 50	\$140 00	\$32,090 62	\$4,813 59	\$27,277 03
2	62,537.5	20	12,507 50	188.5	20	37 70	13.6	3 50	47 60	12,592 80	1,888 92	10,703 88
3	-	-	-	274.1	15	41 11	-	-	-	41 11	6 16	34 95
4	-	-	-	912.5	15	136 87	-	-	-	136 87	20 53	116 34
5	-	-	5 26	615.5	15	92 33	-	-	-	97 58	14 64	82 94
6	40.5	13	25 62	4,219.6	15	632 94	-	-	-	658 56	98 78	559 78
7	197.1	13	404 10	1,867.1	15	280 06	-	-	-	684 16	102 62	581 54
8	3,108.5	13	99 37	13,590.1	15	2,038 51	-	-	-	2,662 68	399 40	2,263 28
9	764.4	13	292 94	5,697.9	15	848 18	87.5	6 00	525 00	1,274 52	191 17	* 1,083 35
10	2,253.4	13	5 52	6,077.4	15	911 55	23.4	6 00	140 40	1,214 07	182 11	1,031 96
11	425	13	217 67	3,320.5	15	498 07	15	6 00	90 00	805 74	120 86	6,845 88
12	1,674.4	13	374 76	8,265.6	15	1,239 84	60.4	6 00	362 40	1,977 00	296 55	1,680 65
13	3,033.6	13	446 29	989.7	15	148 45	20	6 00	120 00	714 74	107 21	607 53
14	3,433	13	97 24	458.5	15	68 77	-	-	-	166 05	24 90	141 11
14 1/2	748	13	-	-	-	-	-	-	-	-	-	-
										\$55,116 46	\$8,267 44	\$46,849 02

*Masonry in bridge, .750 yards, at \$6.

SYNOPSIS of work done on eleven miles of the Central Railroad, from the Illinois river north, up to December 1, 1888.

No. of sections.	Clearing and grubbing.	Cubic yards excavation.	Price.	Amount.	Cubic yards embankment.	Price.	Amount.	Cubic yards cement, clay, gravel, &c., excavation.	Price.	Amount.	Cubic yards dry masonry.	Price.	Amount.	Amount of miscellaneous expenses.	Total amount.	15 per cent. discount.	Total amount paid.
1	\$20	3,699.8	20	\$739 96	271.8	20	\$54 36	5,076.5	40	\$2,030 60	-	-	-	\$15 21	\$2,824 92	\$423 74	\$2,401 18
2	-	1,914.7	13	248 91	251.7	15	37 75	-	-	-	-	-	-	*29 01	301 67	45 25	256 42
3	-	1,161.2	13	151 32	277.7	15	1,240 65	-	-	-	-	\$5	\$757 20	145 88	2,178 18	326 72	1,851 46
4	-	1,067	13	138 71	3,393.7	15	509 05	-	-	-	38.8	6	232 80	192 00	972 56	145 88	826 68
5	-	532.3	13	69 20	3,215.5	15	482 32	-	-	-	23.4	6	140 40	-	757 81	113 67	644 14
6	-	-	-	-	1,600.	15	240 00	-	-	-	37.8	6	226 80	165 89	466 80	67 02	379 78
7	-	-	-	-	1,731.8	15	259 77	-	-	-	31.4	6	188 40	-	448 17	67 22	380 95
8	-	-	-	-	-	-	-	-	-	-	-	-	-	\$202 11	\$7,930 11	\$1,189 50	\$6,740 61
				\$1,348 10			\$2,323 90						\$1,545 60				

* 117 yards ditching, at 13 cents. † 223.2 yards ditching at 13 cents. ‡ Turfing on sections 3, 4, and 5. || 223.2 yards side ditches, on section 4, at 13 cents.

Report of T. B. Ransom.

RAILROAD OFFICE,
 Manville, November 28, 1838.

To E. PECK, Esq.

Commissioner of the Board of Public Works.

SIR: On the first of this month an engineering party of five was organized and put under the immediate charge of Wm. H. Seymour, Esq., for the purpose of making surveys and examinations of the bars and other obstructions to the navigation of the Illinois river, from the termination of the Illinois and Michigan canal to the south line of the northern engineering district.

Although the season was far advanced, it seemed a favorable time for a reconnoissance of the kind, on account of its unusual drought and the consequent shoal water of the river. A suitable boat was procured, and the field operations prosecuted with the utmost diligence and industry; but in consequence of the severity of the weather from the 13th to the 20th instant, the river was frozen over, which, combined with the snow, rendered the soundings and further examinations for the time impracticable. The examinations up to this time had, however, extended to all the obstructions between La Salle and Peoria.

The valley of the Illinois river is a deep cut, varying from 200 to 300 feet, into the rich and luxuriant prairie country through which it passes; and, in ages past, was evidently the outlet of a much greater volume of water than is now found within its banks. Indeed, it can hardly be doubted that at least a portion of the drainage of the northern lakes passed through this valley to the gulf of Mexico. Very low grounds and numerous lagoons are frequently found extending, longitudinally, on either side of the river.

For the volume of water that it now passes, it is unusually deep and clear, with a current so very sluggish as to afford but little resistance to the ascent of boats of any description; affording, therefore, except at extreme low water, one of the best channels for steamboat communication of any river in the country.

The usual obstructions are loose sand bars at or near the mouths of the several tributary creeks and streams.

Two methods of improvement obviously present themselves for adoption: one by means of jetties or wing-dams, and the other by dredging, or excavating the sand at the several bars or shoals.

In consequence of the daming or accumulation of water in this river, by the high floods of the Mississippi, the latter method will undoubtedly be preferable towards the mouth; and, from the character of the river already noticed, it may also secure a sufficient depth of water, for a number of years at least, over the obstructions in the upper portions.

For want of time, it was proposed to make surveys at such points only as obstacles were known or found to exist. The accompanying maps are, therefore, detached portions of the river at these points, extending to navigable waters above and below the several shoals.

The following summary remarks, pertaining to each bar or shoal, together with the channels, bars, and soundings delineated upon the maps,

will, it is believed, make known all the important facts connected with the obstructions between the points above mentioned.

Shoal water, varying in the channel from four to eight feet, is found opposite Enterpize, though there is here no well characterized bar. The first serious obstacle below La Salle, is Spring creek bar, which is 2,000 feet below the mouth of that stream, and about six miles from the termination of the canal. It is a loose sand bar, stretching from the point of a long peninsula on the left bank of the river, diagonally down the stream to the opposite bank; the peninsula is formed by the river on one side, and a deep lagoon on the opposite, and Spring creek on the third side. The bar seems to have been caused by a deposit from Spring creek during high water; at which time the peninsula is overflowed, it being but one foot above the surface at this stage of water—indeed, the bar is but a continuation of this peninsula. The channel passes over about the middle of this bar, and at right angles to its general direction, the shoal water being 2.1 feet. The river is here 330 feet broad, the average breadth of the bar being 420 feet. A fall of .18 only was found here in a distance of 300 feet, extending from deep water above the bar to deep water below. On the lower side, the shoal falls off abruptly, giving a depth of eight feet at a distance of fifty feet from the lower line of soundings.

As the causes of this obstruction are still in operation, it is believed that the best permanent improvement at this place will be a jettee, extending from a suitable point on the left bank upwards, and partially across the river; this would raise the water above, and, by contracting it into a channel around its termination, produce a current there and a short distance below, which would doubtless give the requisite depth of water.

An abundance of stone for such a structure is found along Spring creek, in the immediate vicinity of this bar. Logs and uprooted trees are frequently found along the river, sometimes partially imbedded in the sand, and extending crosswise of the stream; with these exceptions a good channel is found from Spring creek bar to the head of Canan-wood island: here, a loose sand bar extends from the head of this island, in an oblique direction to the channel, which is under the right bank of the river; this channel varies from 150 to 200 feet in breadth, and has a minimum depth of five feet in the centre.

One mile and a half below this island, we come to Negro creek, which comes in through the right bank of the river, and has here deposited a bar of 400 feet in length and 250 in breadth, extending longitudinally in the river opposite the mouth of the creek. At this stage of water it is about one foot above the surface, and extends from the middle of the river nearly to the right shore. The river is here 980 feet wide, the channel varying from 150 to 200 feet in width, with a minimum depth of five feet; passes between the east side of this bar and a shoal extending along the left bank. This shoal is doubtless formed by several large trees which have lodged along the bank of the river and are now embedded in the sand. The two last obstacles, it will be seen, are by no means serious, the shoalest water being five feet; the last would undoubtedly be sufficiently obviated by removing the logs and trees to which reference has been made.

Opposite the mouth of Bureau creek, two and a half miles above Hennepin, a broad shoal makes out from the left bank of the river, though a channel sufficiently broad and deep for boats at this stage of water is found along the right bank.

The next obstacle is at the head of Hennepin island, about one and a half miles below Bureau creek. at which place an extensive shoal spreads from the head of that island, laterally, across the river and to some distance above. The main channel runs from the mouth of Bureau creek across to the left bank, nearly opposite to the head of the island; thence between the island and the left bank, varying in breadth from 100 to 150 feet, with a minimum depth of 2.3 feet. This island, as well as the shoal above it, are doubtless a deposit from Bureau creek—the bar is a loose sand formation similar to those described above. A permanent improvement here would require either a dam from the island to the right shore, or jetties from that shore to the head of the island, by means of which the stream would be turned through the channel along the left bank, and thus secure a sufficient depth of water.

The next obstruction is found about half of a mile below Hennepin. The river is here 330 feet wide; an irregular undulating shoal of light moving sand, nearly half of a mile in length, extends quite across the stream, having upon it a mean depth of water of about two feet. It will be seen by the soundings that the depth of water is here very irregular. No distinct channel could be discovered, but ridges and channels partially traversing the stream, generally at right angles, were found in various places, occasioned, it is believed, by the trees and logs which were found in the bottom more or less imbedded in the sand.

These are necessarily very dangerous for boats, more especially as the sluggishness of the current here produces no discernible ripple. It is probable that by removing these and excavating the sand to some extent, a channel of sufficient depth would be obtained for some time; but as the sand at this place is so exceedingly light and moveable, a more permanent method of improvement would be to construct one or more wing-dams as proposed at Spring creek. From this bar the water is sufficiently deep for a distance of about six miles, where a sand bar is found extending from the head of a low sand island diagonally across the stream, the upper point being 800 feet above the island on the right bank, and the lower point terminating upon another sand island 800 feet below the upper one, near the left bank.

The channel is here near the right shore, the shallowest water being 2.2 feet. At this point, the river is 800 feet wide. Logs and trees were found embedded in various places on this bar; by removing these and excavating about 1,000 cubic yards of sand, a channel sufficiently broad and deep would doubtless be produced along the right bank for all stages of water. A small stream emptying in through the left bank, about three-fourths of a mile above, has doubtless furnished the materials for the present obstruction.

From this place deep water is found to the mouth of Sandy creek, near Henry; here a very loose moving sand-bar extends around the mouth of the creek, which comes in upon the left bank. The channel is said to change its place, more or less, from year to year; the present one, however, is under the right bank where the bar is narrower than at

any other place, being only 300 feet across. The shoalest water found in the channel was 3.2 feet. Trees and logs were also found in this channel. The removal of these and the excavation of about 1,400 cubic yards of sand would probably be the cheapest method of improving the navigation at this place. One mile below Henry, at Willow island, a sand bar was found, as also at the mouth of Crow creek; but at each of these places channels sufficiently broad and deep for all stages of water were discovered.

From the mouth of Crow creek, there are no obstructions to the navigation as far as Peoria; at which place the examinations were discontinued.

From the shoalness of the water in the channels, at some of the bars which have been described above, it will be seen that the navigation of the river at this stage of water, with any class of steamboats now in use, must be entirely suspended; this, indeed, has been the case for more than two months past.

It is unnecessary to add, that this suspension to the navigation of the river is attended with very serious evils to the thousands of inhabitants who are already settled along its fertile valleys, and who at this time depend upon it as a means of communication with their market. This evil is more particularly enhanced at this time, as it is a season of the year when their produce is ready for transportation, and a supply of groceries, merchandize, &c., is necessary for their use and comfort during the coming winter.

From the unparalleled increase of the population of this section of the country, and the strong inducements that will, for many years, still be afforded for augmenting this population, it can hardly be doubted that the real wants and requirements of this section abundantly justify the prospective and liberal policy which has thus far characterised the legislative provisions of the State in relation to the present system of internal improvements.

The difficulty, if not impossibility, of ascertaining the number of logs, trees, &c., that should be removed, as well as the expense incident to such removal—the amount and character of the excavation that may be required, and the expense, per yard, of procuring stone at the different points where this kind of improvement has been proposed—will, it is presumed, be sufficient reason for excusing any attempt at an estimate of the probable expense of these several improvements which have been glanced at so hastily at the present time.

Approximate estimates will, however, be prepared and presented as soon as time will permit.

Yours, respectfully,

T. B. RANSOM, *Engineer.*

Report of T. B. Ransom.

RAILROAD OFFICE,

Manville, Nov. 28, 1838.

TO E. PECK, Esq.

Commissioner of the Board of Public Works.

SIR: I herewith transmit a statement of the facts as well as maps and profiles pertaining to the location of the Central railroad, northerly and southerly from the termination of the eleven miles of the same on each side of the Illinois river, located last spring.

In August, two engineering parties were organized for the above mentioned purpose. Wm. H. Seymour, Esq. was placed in charge of one at the northern termination, with directions to pursue the most "direct and eligible route" to connect with the surveys from Galena, that should be deemed consistent with economy in crossing the intermediate streams and ridges. Geo. W. Gilson, Esq. was also placed in charge of the party at the southern termination, with similar instructions in relation to that point and Bloomington.

It is but justice to these engineers, as well as to the young gentlemen generally who have composed their parties, to remark that their field operations have been conducted in the most prompt and satisfactory manner.

The results of Mr. Seymour's operations are as follows:

DIRECTION.

The tangent at the termination of the eleven miles was continued as far as Bureau creek, a distance of eighteen and a fourth miles from La Salle, from the surveys of last year. This was considered the most favorable point to cross this stream; here the direction was changed 12 degrees to the right on a radius of 10,000 feet, in order to pass the Inlet creek at a point ascertained to be the least expensive; this last tangent was continued as far as the location was made, and if prolonged would strike Rock river about two miles above Dixon's ferry.

TOPOGRAPHY AND GENERAL DESCRIPTION.

The first obstacle encountered is at Negro creek, eleven and a half miles from the river. Here a valley about three-fourths of a mile wide, with a general depression of twenty-five feet, and a steep abrupt bank on the south side, is traversed nearly at right angles by the railroad line. Although this stream bed is frequently dry in summer, it drains a great extent of prairie, and is therefore swollen to a large size in the fall and spring. A bridge of thirty feet span and thirteen feet in height, with a grade on the south side of thirty-two feet per mile for a short distance, will be necessary; an easy grade from this bridge northerly is obtained for a distance of about two miles, from which a grade of forty feet per mile must be adopted, for one and a fourth miles, in order to obtain the summit between Illinois river and Bureau creek.

From Negro creek to the Inlet, the prairie becomes much more rolling and uneven than it is further south. Cuts and embankments varying from five to fifteen feet become frequently necessary, as these undulations or swells, with broad valleys between, are passed nearly at right angles by the railroad line.

At a distance of fifteen and a half miles from La Salle, we arrive at the summit before mentioned, on an ascending grade of thirty feet per mile for a short distance, this point being three hundred and eighty-six feet above the Illinois river.

The grade northerly from this point is unobjectionable as far as Pike creek, a distance of one and a half miles. This creek has a very broad valley, and will require a bridge of the same span and height as proposed at Negro creek. The grade northerly from this stream is also very easy for a distance of about one mile. Eighteen and one-third miles from the Illinois bluff we arrive at Bureau creek, situated in a deep valley not exceeding three hundred and fifty feet broad. A bridge of forty feet span and twenty-four in height will here be requisite, with a descending grade on the south side of forty feet per mile for a distance of one and a fourth miles. From this stream northerly, an ascending grade of thirty-five feet per mile for about one and three-fourths miles must be adopted; the succeeding two and a half miles admit of an easy grade with medium cuts and embankment, which brings us to the foot of the principal ridge; here commences a steep grade of forty-six feet per mile for one and a half miles, which continues to the summit between the Illinois and Rock rivers. This point is found to be four hundred and eighty-nine feet above the Illinois, and twenty-four and one-sixth miles from La Salle. A very gradual descent next occurs for three-fourths of a mile to the northern declivity of the ridge, where a grade of at least sixty-four feet per mile for a distance of two and one-third miles, with cuts and embankments ranging from ten to nineteen feet, becomes unavoidable. From the foot of this ridge, easy undulating grades, with light cuts and embankments, mostly through sand ridges, descend to the Inlet creek, distant from La Salle twenty-eight and two-thirds of a mile. The line passes this stream at a very favorable point, avoiding the low bottoms found above and below, and affording good foundations for a bridge upon a stratum of limestone, which is found a few feet under the surface at this place. The creek here is in a valley eighteen feet deep and two hundred across. A bridge of fifty feet span and thirteen in height will give sufficient water-way for the stream. A gradual ascent from this point is found to a distance of thirty miles from La Salle; at which point the location was discontinued.

The last four and a half miles of the line pass through scattering timber, though of small growth and inconsiderable value, the soil being very shallow and sandy. The ridge mentioned above is composed mostly of a coarser and more compact sand, which, from appearances, would at the depth of five or six feet be difficult to remove. This ridge extends many miles to the right and left of the point where it is traversed by the line; though it is believed that a better grade would be attainable some miles further to the west, passing a few miles easterly of the head of the Winnebago swamp; from which to Rock river an almost level prairie intervenes. Further examinations along this part of

the line seem to be necessary; indeed the passage of the Bureau and Inlet creeks, at points less favorable than those mentioned above, would doubtless be warranted, could a more favorable point of passing this ridge be discovered. Should this not be the case, it may be preferable to make such curves and re-curves in the present line as to pass this ridge obliquely, and thus, by increasing the distance, somewhat diminish the steepness of the grades, as well as the banks and cuttings on either side. Eighteen culverts, varying from three to six feet span, will be necessary on this line, the stone for which must be taken from the bluffs of the Illinois and Little Vermilion, or Spring creek and the Inlet.

The only timber traversed by this line is that noticed at the Inlet and a narrow grove at Bureau creek; valuable groves are, however, situated on either side, varying in distance from three to ten miles of the line.

Mr. Gilson's operations on the south side of the Illinois give the following result:

DIRECTION.

The tangent at the termination of the eleven miles was continued to the north line of McLean county, a distance of nineteen miles, or thirty from the Illinois river.

TOPOGRAPHY AND GENERAL DESCRIPTION.

The whole extent of this nineteen miles is on a high prairie, with very few valleys or undulations, having a deep rich soil, varying from one and a half to three feet deep, and underlaid by a formation more or less argillaceous.

The commencement is at an elevation above the Illinois of two hundred and thirty-seven feet, and with the exception of a few very gentle undulations, a gradual ascent is found to a distance of 2.6 miles, which is the summit between Cedar and Sandy creeks. This point is thirty-seven feet above the commencement, or two hundred and seventy-four above the river. At distance of five miles from this summit, we arrive at Sandy creek, in a valley about two miles broad, the lowest point of which is one hundred feet below the summit mentioned above. This would give a uniform grade of thirty feet per mile, but the mile adjacent to the creek will require a grade of about thirty-five feet per mile; a similar grade will be requisite in ascending the opposite inclination of the valley for about the same distance. A bridge of thirty feet span and fourteen feet high will be necessary at this creek; from the valley of which, we find a very even surface, though gradually ascending till we arrive at the south line of the county, where the elevation is two hundred and ninety-one feet above the Illinois river.

Five or six small culverts will be necessary to pass the tributaries of Sandy creek, suitable stone for which as well as for the bridge abutments can be obtained along that stream but a short distance from the line. Timber suitable for the superstructure of the road can be obtained

along this creek also, and the head waters of the Vermilion, at distances varying from two to six miles. It should be remarked that this tangent is nearly on the right line between the termination of the canal and Bloomington, and probably presents as few obstacles to the economical construction of a railroad as any other of the same extent in the country.

As the field operations are but just completed, I am unable at this time to present all the necessary plans, estimates, &c., that are required on this part of the work; these are, however, in progress, and will be transmitted in due time.

Yours, respectfully,

T. B. RANSOM, *Engineer.*

DOCUMENT

Accompanying the Report of M. K. ALEXANDER, Commissioner, to the Board of Public Works.

Report of J. W. Hoyt, Engineer for the Eastern Engineering District.

PARIS, ILLINOIS, JUNE 1, 1838.

To the Honorable the BOARD OF PUBLIC WORKS.

GENTLEMEN: Having been appointed to make the surveys of the proposed railroads in the eastern engineering district of the State of Illinois, in compliance with the law to establish and maintain a general system of internal improvements, and having attended to the service under the direction of one of your Board, Milton K. Alexander, Esq., acting Commissioner for the fourth judicial circuit, I now respectfully present the following report in relation thereto, with the estimates, plans and profiles of the routes surveyed.

Immediately after appointment, I reported myself to the acting Commissioner for the fourth judicial circuit, and received instructions to proceed to the city of New York, to procure the necessary instruments, and to engage the requisite assistants for the surveys. After complying with these instructions, I returned to Illinois on the 8th of June, 1837, and immediately organized the first engineering corps.

CENTRAL BRANCH RAILROAD.

With the first corps I commenced the experimental surveys at Terre Haute, in Indiana, for the location of this road, and continued them eighteen and one-half miles to Paris, Edgar county, Illinois, the last town in the State through which the location is required to be made; but as the country was found to be much broken and covered with a dense forest, time for a minute examination became necessary; and it was not until two hundred miles of experimental lines had been traced, that the approximate location was obtained. This location passes the eastern boundary of the State near the head waters of Middleton's creek, about one mile north of a direct line from Terre Haute to Paris, and continues nine miles straight, over a very level and heavy timbered country, to Sugar creek, a small stream that runs two miles east of Paris, and flows into Wabash river three miles below Terre Haute. From this creek a deflection of about fifty degrees to the left, on a radius of three thousand feet, and the maximum grade of forty feet to the mile, became necessary to ascend the elevated table land on which the town of Paris is situated; and the country being somewhat undulating, several tressle bridges and heavy embankments will be required for the graduation of the road.

The next point being Charleston, in Coles county, I continued the experimental surveys from Paris to that town, and, finding the topography of the country favorable, located the approximate line from the proposed depot, situated about five hundred feet north of the court house at Paris, direct to Charleston, a distance of twenty-seven miles. This line passes over a level prairie, requiring but little grubbing and clearing, and light excavations and embankments for nineteen miles, to a point four and one-

half miles east of Embarrass river, where the timber commences, and the country becomes more broken; and as the line advances towards the river, heavy excavations and embankments are to be encountered; and to cross it a bridge of two hundred and twenty feet in length will be required. After passing Embarrass river, the country still continues broken, and will require cutting and filling from five to forty feet, for about one mile, where the grade intersects a level prairie which continues without interruption to Charleston.

Shelbyville, in Shelby county, being the next and last point in the eastern district, I continued the experimental surveys from Charleston to that town, and found after a thorough examination of the country, that it was advisable to run by a reversed curve, northwesterly from Charleston, two miles, to avoid the broken ground adjacent to Muddy and Kickapoo creeks; after passing which, the line was continued thirty and one-half miles direct, but three degrees from a straight course towards Shelbyville, to Kaskaskia river; and as the river passes within three thousand feet, and is one hundred and twelve feet below the town, much difficulty was found in selecting a favorable crossing. After a thorough examination of the country for six miles, both north and south of Shelbyville, it was found advisable to pass the Kaskaskia nearly opposite to the town, eighty-five feet above low water mark; and by a deep cut at the village of Shelbyville, the grades of the Central Branch and Central roads are brought upon the same horizontal plane. The country between Charleston and Shelbyville over which the line is located is generally a level prairie, and no difficulties are to be encountered in graduating the road, with the exception of crossing Kaskaskia river and the adjoining valley, which will require heavy embankments and an expensive bridge.

NORTHERN CROSS RAILROAD.

By the act establishing the internal improvements, this road is required to be located in the eastern district, as follows, viz: through the towns of Decatur, Macon county, Sydney, Champaign county, Danville, Vermilion county, and to the east line of the State, in the direction of Lafayette, in Indiana.

With the second engineering corps, which was organized on the 1st of July, 1837, I commenced the surveys of the Northern Cross railroad at Danville, by examining the topography of Big Vermilion river, which it was found necessary to pass, and selected two crossing places for a minute examination; the first located near the upper, and the second near the lower end of Danville. Over the first crossing I ran two lines, one descending with the maximum grade of forty feet to the mile, passed the river seventy-five feet above low water mark, and continued up a very broken valley, for about five thousand feet, to the level prairie; the other passed the river near the same place, eighty feet above low water mark, and immediately ascended to the surface of the prairie. Both of these lines were found very unfavorable, requiring heavy embankments upon the Danville side—the one a sinuous location up the valley before mentioned, the other a very heavy cut on the opposite side of the river. The survey of the lower crossing was commenced in and continued

down Hazle street, in Danville, nearly to the river, and passing seventy-five feet above low water mark, was continued up a deep valley requiring but little cutting and filling, and over a level prairie for three thousand feet, where the ascending grade of forty feet to the mile intersected the surface of the ground. As the graduations upon this line were found to be much less, and no other expenses to exceed the upper crossings, it was adopted as the most favorable location of the road.

After passing the Big Vermilion, the surveys were continued on a direct course to Sydney; but as the country proved very broken, the line was deflected to the left, and run over a level prairie to Butler's point, situated near Danville and Sydney road, about six miles from Danville village. At Butler's the line had passed the broken ground that prevented a direct location from the crossing of Vermilion river, and as there was no obstruction it was continued direct, seventeen and one-half miles over a very level prairie, to Sydney.

From Sydney two experimental lines were traced to Decatur; and finding the country favorable, the approximate location was made direct between these two towns, a distance of forty-eight miles. This line for much of the distance passes over a dry prairie requiring but little graduation, with the exception of crossing Sangamon river, four and one-half miles east of Decatur, where a bridge of two hundred feet in length will be necessary.

From Danville to the east line of the State, in the direction of Lafayette, in Indiana, I traced an experimental line, and continued it to Williamsport, a town situated on Wabash river, near a direct course between Danville and Lafayette. After obtaining a thorough knowledge of the topography of Williamsport and the adjacent country, the approximate location was commenced at Danville, and continues nine miles straight to the east line of the State, as near a direct course towards Lafayette as it was practicable to build the road. This location is generally over a level prairie, presenting but little obstruction to building the road, with the exception of crossing Stoney creek and the adjacent valley, which require only a large stone culvert and an embankment of about twenty feet in height and eighteen hundred in length.

CENTRAL RAILROAD.

The towns designated in the eastern district by the act establishing the internal improvements, through which this road is required to be located, being Decatur, Macon county, Shelbyville, Shelby county, and Vandalia, Fayette county, I commenced the surveys at Decatur, and ran an experimental line direct to Shelbyville; but as the ground contiguous to the crossing of Sangamon river, about one mile south of Decatur, was found much broken, it became necessary to examine minutely the topography of the river, to obtain, if practicable, a more favorable crossing. This examination resulted in selecting the place for passing the river about one thousand feet west of a straight line from Decatur to Shelbyville, and the approximate location was made direct from Decatur one mile to this crossing; and, passing the river fifty-five feet

above its waters, was continued on the same course four miles, where a deflection of twenty-four degrees to the left became necessary. From this deflection the line continues straight twenty-six and one-half miles to Shelbyville, from which the first experimental line to Vandalia was run direct; but as it crossed Kaskaskia river several times, and continued much of the distance on its bluffs, it was found wholly impracticable; and a second line was traced from Vandalia northerly, to secure, if possible, distance sufficient on the west side of Kaskaskia river to enable a direct location to be made for the remainder of the distance; but the broken ground contiguous to Ramsay's and Beck's, Cold Spring and Robinson's creeks, prevented; and it was not until several lines had been traced, and a thorough knowledge of the country obtained, that the approximate location was completed. This location passes from the village of Shelbyville thirty-two degrees to the right of a direct line to Vandalia for three and one-half miles to Robinson's creek, where a deflection of thirty-three degrees to the left was made, and the line continued on a tangent five miles, where a deflection of three degrees to the right became necessary; and from this curve the line was continued direct, passing Beck's and Ramsay's creeks about six miles from Kaskaskia river, to a point about four miles northwest of Vandalia, where another deflection to the left was made; and from this curve the line was located straight to Vandalia.

The country between Decatur and Shelbyville, over which the line is located, is, in general, a level wet prairie; and to protect the railway from water, the grade for much of the distance will be from two to five feet above its surface. No other impediments are presented to building the road, with the exception of crossing Sangamon river and valley adjoining it, which will require heavy embankments and a bridge of about two hundred feet in length. From Shelbyville to Vandalia, the country is broken by the valleys of Robinson's, Cold Spring, Beck's, and Ramsay's creeks, all of which it will be necessary to pass; and the graduations of the road in many places must be made by deep cuttings and fillings, instead of light embankments of borrowed earth taken from side ditches, which, from the levelness of the country, is more often required.

For more details respecting the locations of the roads, I refer the honorable Board to the annexed tables and the accompanying plans and profiles of the routes surveyed.

CONSTRUCTION.

The first object claiming attention in the construction of a railroad, is the graduation or reduction to a series of planes, of certain inclinations and widths, the country over which the line is located.

The planes of the roads in the eastern district are to be formed from fourteen to fifteen feet in width, and to have any inclinations not exceeding the rate of forty feet to the mile. The ground thus graduated will admit of a single railway to be laid upon it, formed for both horse and locomotive power. The method proposed to obtain these planes, is by bridging over the rivers and deep valleys, and constructing culverts of wood or stone over small streams; and by excavating the ground above, and, with the material excavated, embanking the valleys and ground be-

low the grade lines. Where the excavations exceed the embankments, the surplus is to be thrown out upon the sides of the cuts, or wasted in spoil-banks in the most convenient places; but where the embankments exceed the excavations, the excess is to be supplied by earth taken from side ditches, excavated parallel with the outside slopes of the embankments, the inclinations of the sides of the embankments varying from forty to sixty degrees, and the sides of the excavations to be according to the material excavated, and will incline from thirty to eighty degrees.

The surface of the ground, previous to receiving the embankments, is to be cleared from all vegetable matter; and where trees and saplings are found on all cuts, and where the embankments are less than four feet in height, they are to be grubbed, together with the roots above the surface of the ground; but where the embankments exceed four feet in height, the trees, bushes, &c., are to be cut close to the surface of the ground and removed, with all other vegetable matter, to a distance of at least forty feet from the centre of the road. All trees, bushes, &c., that occur outside of the cuts and embankments, and within forty feet of the centre line of the road, are to be cut within one foot of the ground and removed, together with all logs, stumps, &c.

The bridges over large streams to be built of wood upon Long's plan; the dimensions of the timber, number of stringers, braces, &c., to conform to the spans as given in a work entitled "A description of Col. Long's bridges, together with a series of directions to bridge builders;" with the exception of having four stringers, five braces, &c., for the middle truss work where the spans exceed one hundred and seventy-eight feet; to be built of suitable sawed timber, procured nearest to the location, free from knots, shakes and splits; and, after completion, well painted without planing, and supported by double bolster frames, resting upon wooden tressles: these tressles supported by dry masonry laid in regular courses, with the beds of the stone well hammer-dressed. The railway to be upon the top of the middle stringers, and where a common roadway is required, the lower stringers are to be planked, and the road brought to them by embankments or tressle work, so as to admit the passage of all teams, &c., under the railway, and thereby avoiding the danger they would be subjected to, were they to pass upon the same level with the engine and cars.

Bridges of the above description, with the exception of the common roadway, of spans from one hundred and fifty to two hundred and forty feet, will be required on the Central Branch railroad, for passing Embarrass river near Charleston, and Kaskaskia river at Shelbyville, (see plate 7,) and on the Northern Cross railroad, with the common roadway, for crossing Big Vermilion river near Danville; and without the common roadway, for passing Sangamon river near Decatur, (see plate 8;) and also on the Central railroad, for passing the Sangamon one mile south of Decatur.

To pass deep valleys where the cost of embanking would be too great, tressle bridges built of sound white, burr, or post-oak, from the simple post and stringer to those formed by a combination of corbels, struts, and straining-beams will be required (see plates 10 and 11) on the Central Branch railroad; those of about fifty feet span will be necessary to pass Lane's branch and Sugar creek, near Paris; and to connect the

embankments with the bridge over Kaskaskia river, and on the Northern Cross railroad, to connect the ends of the bridges over Sangamon and Big Vermilion rivers with the embankments; and on the Central railroad to pass Beck's creek, between Shelbyville and Vandalia, and to connect the embankments with the bridge over Sangamon river, near Decatur.

To pass creeks where the embankments are more than ten feet in height, arched or box culverts, built of dry rubble masonry, will be necessary; and for the passing of streams where the embankments are less than ten feet in height, and where sluices are necessary to prevent water from accumulating in basins and overflowing the road, wooden culverts are to be built, brought to the grade, and so formed that stone can be substituted in their places, after the completion of the graduation, without interrupting the transportation on the track.

THE SUPERSTRUCTURE.

After the completion of the graduations, the roads are prepared to receive the railways; and as the act establishing the internal improvements is silent upon the form of the track or railway, with the exception of specifying a wooden superstructure; and as your honorable Board have submitted their constructions to the engineers of the different districts, I propose the following to be adopted on the roads under my charge.

It is intended to form the superstructure by a combination of string-pieces, mud-sills, sleepers, keys, and the iron necessary for the track, viz: the rails, plates, and spikes. The string-pieces to be sawed from sound white, burr, or post-oak, locust or black-walnut, free from sap-wood and all defects that will impair its strength, tenacity, or durability, eight and one quarter inches in width by four and one half in thickness, of not less than fourteen feet three inches in length; and if longer to increase by lengths of four feet nine inches. The mud-sills to be sawed or hewed from any of the above mentioned oaks, or black-walnut, sassafras or locust, free from all defects, two and three quarter inches in thickness, and of not less than ten inches in width, exclusive of the sap-wood, and twelve or more feet in length. The sleepers to be formed from any of the last mentioned timbers, eight feet in length, and of not less than eight inches in diameter, exclusive of the sap-wood; and their ends to be cut or sawed off at right angles; to be hewed, free from windings on one side, through their entire lengths, so as to have a bearing of at least four inches on any part; and on the opposite side two notches to be formed from three to six inches in depth, according to the diameter of the sleepers, and of sufficient width to admit the string-pieces, and keys to be inserted in them, the base of the notches to be parallel with the hewed side, and a perpendicular thickness of at least two inches to be left between the notches and the bottom or hewed part of the sleepers between the notches to be cut out circular, to adapt them to a horse path; but in no case are they to be reduced to a less thickness than three and three quarter inches. The keys to be eighteen inches in length, two in width, and two in thickness at the largest, and three quarters at their smallest ends.

Two continuous lines of mud-sills, prepared as above described, are then to be laid longitudinally upon the grade of the road, parallel to

each other, four feet nine inches from centre to centre, and under their ends, and in contact with them, mud-sills three feet in length, to be so placed that the ends of the top sills will have an equal bearing on those beneath, and the whole bedded into the road, so that the upper surfaces of the mud-sills will be even with the grade. Sleepers prepared as above described are then to be placed transversely upon the mud-sills, parallel to each other, four feet nine inches from centre to centre, and two continuous lines of string-pieces, (the width of eight and one quarter inches being vertical,) are then to be inserted in the notches, and confined in their places, by driving the keys before mentioned between the inside of the string-pieces and the notches. On the top and middle of the string-pieces, plate-iron rails from twelve to fifteen feet in length, two and one half inches in width, and five-eighths of an inch in thickness, are to be nailed every eighteen inches, with spikes four and one-half inches in length, driven through holes counter-sunk in the rails; the width between the rails to be four feet eight inches and three quarters, and under their ends, a small plate of iron to be inserted, to prevent them from settling unequally into the string-pieces. The projecting edges of the string-pieces on the inside of the rails are to be chamfered, so that the flanges of the wheels to be used upon the road will not come in contact with them; and the outer edges from the side of the rails are also to be chamfered sufficiently to carry off all water.

After the railway is laid and brought to proper adjustment, gravel or sand is to be filled in between the rails to form a horse-path; a cross section of the filling to present an arch of a circle, the highest part of which will cover the middle of the sleepers two inches, and the lowest to cover the mud-sills, but to leave a space under the stringers of sufficient width to carry off all water that would otherwise accumulate between them.

ESTIMATES.

The annexed tables exhibit the grades and horizontal curvatures, and the estimated cost of constructing the railroad, in the eastern district, viz: the Central Branch from the east line of the State to Shelbyville; the Northern Cross from the east line of the State to Decatur; and the Central from Decatur to Vandalia.

Tables No. 1, 9 and 18, exhibit the grades and horizontal curvatures. Tables Nos. 2, 3, 4, 5, 10, 11, 12, 13, 14, 19, 20, 21 and 22, exhibit the estimates for the graduation. Tables No. 6, 15 and 23, exhibit the estimates for the superstructures. And tables No. 7, 8, 16, 17, 24 and 25, exhibit a recapitulation and summary of the whole.

CENTRAL BRANCH RAILROAD.

TABLE No. I.

An exhibit of the Grades and Horizontal Curvatures, from the east line of the State to Shelbyville.

No. of the grades.	Length of the grades, in feet.	Inclination of the grades per mile, in feet and hundredths.	No. of feet of straight line.	Number of feet of curved line.	Radii of the curves.	Remarks.
1	5,400	-	5,400	-	-	At the State line.
2	5,200	27.4	5,200	-	-	
3	4,600	3.4	4,600	-	-	
4	4,400	14.0	4,400	-	-	
5	4,000	-	4,000	-	-	
6	6,400	13.0	6,400	-	-	
7	3,200	-	3,200	-	-	
8	4,000	18.5	4,000	-	-	
9	3,200	9.9	3,200	-	-	
10	1,900	33.4	1,900	-	-	
11	3,200	-	3,200	-	-	At Lane's branch.
12	2,400	30.8	300	2,100	3,000	
13	1,200	-	1,200	-	-	At Sugar creek.
14	3,600	36.7	3,600	-	-	
15	4,800	15.3	4,800	-	-	Near Paris depot.
16	3,200	40.0	3,200	-	-	
17	2,800	-	2,800	-	-	
18	4,800	11.0	4,800	-	-	
19	3,600	-	3,600	-	-	
20	2,800	7.6	2,800	-	-	
21	3,600	-	3,600	-	-	
22	2,800	7.6	2,800	-	-	
23	2,000	23.5	2,000	-	-	
24	2,800	-	2,800	-	-	
25	3,200	23.1	3,200	-	-	
26	2,400	29.0	2,400	-	-	
27	4,400	2.0	4,400	-	-	
28	5,500	2.5	5,500	-	-	Over a dry prairie, between Paris and Charleston.
29	6,885	9.2	6,885	-	-	
30	8,440	12.0	8,440	-	-	
31	3,700	23.7	3,700	-	-	
32	5,550	4.3	5,550	-	-	
33	7,150	7.0	7,450	-	-	
34	12,765	11.0	12,765	-	-	
35	6,145	5.5	6,145	-	-	
36	9,900	9.0	9,900	-	-	
37	3,855	10.0	3,855	-	-	
38	9,500	16.8	9,500	-	-	

CENTRAL BRANCH RAILROAD—Continued.

TABLE No. 1—Continued.

No. of the grades.	Length of the grades, in feet.	Inclination of the grades per mile, in feet and hundredths.	Number of feet of straight line.	Number of feet of curved line.	Radii of the curves.	Remarks.
39	3,400	40.0	3,400	-	-	To Embarrass river.
40	400	-	400	-	-	Passes Embarrass river.
41	2,800	40.0	2,800	-	-	From Embarrass river.
42	6,905	19.0	6,905	-	-	
43	4,000	10.0	4,000	-	-	
44	4,200	12.0	1,600	2,600	4,000	To Charleston village.
45	8,533	11.0	5,333	3,200	4,500	
46	4,605	15.8	4,605	-	-	Passes Muddy creek.
47	4,150	15.7	4,150	-	-	
48	4,915	20.6	4,915	-	-	Passes Kickapoo creek.
49	3,220	7.4	3,220	-	-	
50	6,315	18.0	6,315	-	-	
51	7,000	9.0	7,000	-	-	
52	8,500	11.0	8,500	-	-	
53	8,240	18.6	8,240	-	-	
54	6,715	8.4	6,715	-	-	
55	7,435	6.6	7,435	-	-	
56	5,320	8.7	5,320	-	-	
57	7,310	30.0	7,310	-	-	
58	4,315	10.6	4,315	-	-	
59	2,760	-	2,760	-	-	On the summit.
60	10,380	5.3	10,380	-	-	
61	10,285	13.5	10,285	-	-	
62	8,000	8.0	8,000	-	-	
63	8,880	4.0	8,880	-	-	
64	16,190	9.3	16,190	-	-	
65	13,345	5.6	13,345	-	-	
66	11,090	15.0	11,090	-	-	
67	8,545	33.0	4,900	3,645	5,800	Descends to Kaskaskia river.
68	1,000	-	1,000	-	-	Passes Kaskaskia river.
69	2,090	40.0	2,090	-	-	Ascends to Shelbyville.

CENTRAL BRANCH RAILROAD—Continued.

Tables No. 2, 3, 4, and 5, exhibit the number and length of the sections on the 1st, 2d, 3d, and 4th divisions, extending from the State line to Shelbyville—the cubic yards of excavation put into embankment, and wasted in spoil-banks—of borrowed earth—perches of stone work—square rods of grubbing and clearing—lineal feet of bridging—wooden culverts—sundries—the price and amount of each, and the total of all.

TABLE No. 2—Division 1, extending from the State line westerly.

Number of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard, in cents.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard, in cents.	Amount.	Cubic yards of borrowed earth.	Price per yard, in cents.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod, in cents.	Amount.	Sundries—sodding and ditching.	Total Amount.
1	4,500	965	25	\$241 25		13	\$2,553 98	19,646	13	\$3,100 00	300	\$7 00			2 45	\$2,100 00	1,411	58	818 38		\$5,713 61
2	5,300	1,197	22	263 34		16	1,260 96	7,881	16					2 45	\$90 00		1,529	50	764 50		2,378 80
3	4,200	841	16	134 56		14	1,434 44	10,246	14					1 45	45 00		1,394	90	1,254 60		2,868 60
4	5,600	832	25	208 00		13	7,832 13	7,832	13					1 45	45 00		1,547	58	897 26		2,168 42
5	4,400	1,666	25	416 50		13	1,448 98	11,146	13					1 45	45 00		1,295	58	751 10		2,661 58
6	5,600	400	25	100 00		13	1,223 56	9,412	13					1 45	45 00		1,646	58	954 68		2,323 21
7	4,400	901	25	225 25		13	2,778 36	21,372	13		400	7 00	2,800 00	1 45	45 00		1,295	58	751 10		6,599 71
8	5,600	1,000	25	250 00		13	1,198 08	9,316	13		160	7 00	700 00	2 45	90 00		1,646	58	954 68		3,192 76
9	5,400	5,500	23	1,265 00	2,000	20	180 00	9,216	20		500	9 25	4,625 00	1 45	45 00		1,205	67	807 35		7,262 35
10	5,600	10,000	23	2,375 00	6,664	15		2,164	15		900	9 25	8,325 00				1,647	50	823 50		12,523 10
11	5,600	20,821	20	4,164 20				900	20		300	7 00	2,100 00	3 45	135 00		1,276	55	701 80		7,398 37
12	6,000	798	16	127 68				2,379	12					2 45	90 00					150	944 55
13	6,400	3,172	19	602 68				4,615	12					2 45	90 00					175	1,448 60
14	5,200	4,000	19	760 00	1,500	12		4,944	11					1 45	45 00					150	1,167 66
15	6,000	1,042	15	156 30	1,000	14		278	14					4 45	180 00		588	64	376 32		1,815 04
16	5,200	6,604	14	924 56				5,803	14					1 45	45 00					150	3,219 56
17	5,600	500	22	110 00				14,000	15					1 45	45 00					250	1,652 95
18	4,600	300	22	66 00				9,976	13					2 45	90 00					235	1,953 58
				66 00				11,437	13					2 45	90 00					235	1,953 58

CENTRAL BRANCH RAILROAD—Continued.
TABLE No. 3—Division 2, extending to Charleston.

No. of the sections.	Length of the sections in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding & ditching.	Total Amount.
19	9,000	10,550	26	\$2,743 00	-	-	8,000	13	1,040 00	-	-	-	-	-	-	26	2	\$6 120 00	-	-	-	\$100	\$4,903 00	
20	6,000	532	20	106 40	-	-	9,743	13	1,266 59	-	-	-	-	-	-	26	2	120 00	-	-	-	200	1,692 99	
21	6,000	549	20	109 80	-	-	11,311	13	1,470 43	-	-	-	-	-	-	16	1	60 00	-	-	-	150	1,790 23	
22	5,900	3,549	26	922 74	2,000	13	5,356	13	696 28	-	-	-	-	-	-	26	2	60 00	-	-	-	100	2,039 02	
23	6,195	10,413	26	2,707 38	-	-	5,802	13	754 26	-	-	-	-	-	-	26	2	120 00	-	-	-	150	1,407 30	
24	6,400	1,596	24	383 04	-	-	14,421	12	1,730 52	-	-	-	-	-	-	26	2	120 00	-	-	-	150	1,309 30	
25	6,000	5,949	22	1,308 78	-	-	6,951	13	903 63	-	-	-	-	-	-	26	2	120 00	-	-	-	200	1,353 95	
26	5,700	732	26	190 32	-	-	20,686	12	2,482 32	-	-	-	-	-	-	26	2	120 00	-	-	-	-	2,846 24	
27	6,700	2,488	24	597 12	-	-	3,359	12	403 08	-	-	-	-	-	-	26	2	120 00	-	-	-	-	2,854 13	
28	6,000	7,705	26	2,003 30	-	-	5,279	13	686 27	-	5	550	-	-	-	26	2	120 00	-	-	-	-	3,359 83	
29	5,500	4,627	23	1,064 21	-	-	2,498	12	299 76	-	5	500	-	-	-	26	2	120 00	-	-	-	-	3,818 26	
30	5,200	7,000	25	1,750 00	3,000	13	390	-	299 76	-	5	500	-	-	-	26	2	120 00	-	-	-	-	4,891 74	
31	5,000	14,775	24	3,546 00	-	-	3,977	12	477 24	-	-	-	-	-	-	26	2	120 00	-	-	-	-	87,475 16	
32	6,000	122,332	23	34,224 96	3,500	14	490	-	477 24	-	7,300	6 43,300	210 29	\$6,090	-	-	-	-	-	-	-	*2,500	22,370 84	
33	5,800	38,911	24	7,782 20	-	-	45,248	18	8,144 64	-	5	6,950	-	-	-	26	2	120 00	-	-	-	-	-	3,174 00
34	6,000	14,200	22	3,124 00	-	-	26,873	14	3,762 22	-	-	-	-	-	-	26	2	120 00	-	-	-	-	-	4,174 29
35	4,800	1,064	23	244 72	-	-	-	-	-	-	-	-	-	-	-	26	2	120 00	-	-	-	-	-	97 35

* Bridge foundations and trestle and bolsters.

CENTRAL BRANCH RAILROAD—Continued.
TABLE No. 5—DIVISION 4, extending to Shelbyville.

No of the sections.	Length of the stations, in feet.	Cubic yards of exca- vation put into em- bankment.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of bor- rowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Tanal feet of bridg- ing.	Price per foot.	Amount.	No. of wooden culvits.	Price for each.	Amount.	No. of rods of grub- bing and clearing.	Price per yard.	Amount.	Sandries—sodding & ditching, &c.	Total amount.
52	6,000	1,596 22	cts	\$351 12			6,624 13	cts	\$561 12							\$110	255	\$255					\$ 00	\$1,522 24
53	7,000	1,156 23		265 85			9,174 13		1,192 65							55	155	155					100	1,613 50
54	6,500	4,030 24		967 90			5,454 13		709 02							55	155	155					100	1,831 22
55	5,000	685 23		152 95			6,553 13		851 89							110	233	233					100	1,914 84
56	5,000	1,000 25		250 06	2,724 11	\$299 64	9,854 13		371 02							110	233	233					175	1,305 66
57	6,000	1,536 22		351 12			8,472 14		1,186 08							110	233	233					150	1,742 20
58	7,500	1,330 22		292 60			4,972 14		696 08							110	233	233					250	1,948 68
59	6,500	488 23		112 24			8,787 14		1,230 18							55	110	110					175	1,627 42
60	6,000	3,094 24		742 56			1,476 15		221 40							55	110	110					250	1,808 96
61	7,500	1,330 24		319 20			13,540 12		1,624 80							55	110	110					100	2,154 00
62	5,888						8,247 13		1,072 11							55	110	110					150	1,277 11
63	5,150	532 22		117 04			12,293 13		1,598 09							50	130	130					100	1,875 13
64	7,800	2,064 25		516 00	4,000 11	440 00	3,594 13		467 22							50	130	130					100	2,243 22
65	5,600	3,030 22		666 60	1,000 10	100 00	39,206 14		5,488 81		390	5 1,500				100	250	250						8,528 94
66	4,400	14,831 20		2,906 20			102,500 16		16,400 00		1,400	6 8,400		150 } 1,000 } 200 } 150 } 26 } 16 }	7 } \$1,050 } 26 } 16 }								1,096 50	68,561 20

*Bridge foundations, and for trestle and bolster frames.

TABLE No. 6.

The Superstructure.

An exhibit of the number and lengths of the divisions—lineal feet of stringers and mud-sills—number of sleepers and keys—tons of rail-way iron—pounds of spikes and plates—the price and amount of each, delivered upon the road every two hundred feet—rods of rail-laying—with the price and amount, and total of all.

No. of the divisions.	Length of the divisions, in feet.	Lineal feet of string-pieces.	Price per ft.	Amount.	Lineal feet of mud-sills.	Price per ft.	Amount.	Number of sleepers.	Price for each	Amount.	No. of keys.	Price for each	Amount.
			<i>cents.</i>			<i>cents.</i>			<i>cents.</i>			<i>cents.</i>	
1	95,100	190,200	5.3	\$10,080 60	237,750	4.3	\$10,223 25	20,021	14	\$2,802 94	40,042	2	\$800 84
2	102,195	204,390	5.5	11,241 45	255,486	4.5	11,496 87	21,514	17	3,657 38	43,028	2	860 56
3	86,500	173,000	5.5	9,515 00	216,250	4.5	9,731 25	18,210	17	3,095 70	36,430	2	728 46
4	91,838	183,676	5	9,183 80	229,595	4	9,183 80	19,334	14	2,706 76	38,668	2	773 26

The Superstructure—Continued.

No. of the divisions.	Tons of rails.	Price per ton.	Amount.	Pounds of spikes.	Price per lb.	Amount.	Pounds of plates.	Price per lb.	Amount.	Rods of rail-laying.	Price per rod, including the fittings of track.	Amount.	Total amt.
					<i>cents.</i>			<i>cents.</i>					
1	396	\$100	\$39,600 00	17,514	15	\$2,627 10	7,044	11	\$774 84	5,763	\$4	\$23,052 00	\$89,961 57
2	426	100	42,600 00	18,821	15	2,823 15	7,570	11	832 70	6,193	4	24,772 00	98,284 11
3	360	100	36,000 00	15,930	15	2,389 50	6,400	11	704 77	5,243	4	20,972 00	83,136 62
4	383	100	38,300 00	16,914	15	2,537 10	6,802	11	748 22	5,566	4	22,264 00	85,637 04

RECAPITULATION OF THE CENTRAL BRANCH RAILROAD.—TABLE No. 7.

The Grades and Curvatures.

No. of the grades.	Total length.	Mean inclination per mile, in feet and hundredths.	Number of feet of straight line.	Number of feet of curved line—the radii of the curves from 3,000 to 5,800 feet.
69	375,633	13.1	364,088	11,545

The Graduation.

No. of the divisions.	Length of the divisions, in feet.	Cub. yds. excavated in caava, put in to embank't.	Amount.	Cubic yards washed in spoil-banks.	Amount.	Cubic yards of borrowed earth.	Amount.	Perches of masonry.	Amount.	Lineal feet of bridging.	Amount.	No. of wooden culverts.	Amount.	No. of rods of grubbing & clearing.	Amount.	Amount for sundries.	Total amt.
1	95,100	60,539	\$12,390 32	11,164	\$1,659 60	150,183	\$20,317 29	-	2,500	26	\$1,170	26	\$1,170	16,479	\$9,855 27	\$1,250	\$67,292 48
2	102,195	246,872	62,807 97	8,500	1,140 00	169,504	24,117 24	8,620	\$50,300 210	6,090	21	21	1,280	8,967	4,902 45	3,700	154,337 66
3	86,500	47,834	11,399 75	6,759	833 16	83,756	10,751 57	360	1,800	750	12	12	620	4,992	2,648 90	1,875	35,578 38
4	91,838	36,742	8,070 71	7,724	839 64	233,746	33,970 47	1,700	9,900	1,350	20	20	1,085	4,077	2,038 50	11,856	98,004 32
	375,633	391,987	94,668 75	34,147	4,472 40	637,189	89,156 57	10,680	62,000	4,810	79	79	4,155	34,515	19,445 12	18,675	355,212 84

The Superstructure.

Total length of the road, in feet.	Lineal feet of stringers.	Amount.	Lineal feet of mud-sills.	Amount.	Number of sleepers.	Amount.	Number of keys.	Amount.
375,633	751,266	\$40,020 85	939,081	\$40,635 17	79,079	\$12,962 78	158,158	\$3,163 16

The Superstructure—Continued.

Tons of rails.	Amount.	Pounds of spikes.	Amount.	Pounds of rail laying.	Amount.	Total amount.
1,565	\$156,500 00	69,179	\$10,376 85	27,823	\$3,060 53	\$91,960 00
				22,765	\$91,960 00	\$357,079 34

Summary of estimates of the Central Branch Railroad.

TABLE No. 8.

Of the graduation	- - - -	\$355,212 84 = \$4,992 96 per mile.
Of the superstructure, including the gravelling of the railway	- - - -	357,079 34 = 5,019 20 per mile.
Three depots, viz: at Paris, Charleston, and Shelbyville	- - - -	24,000 00
Land, damage, and depot ground	- - - -	7,100 00
Engineering and contingencies connected therewith	- - - -	10,000 00
Total estimate of the Central Branch Railroad, from the east line of the State to Shelbyville		753,392 18 = 10,589 88 per mile.

NORTHERN CROSS RAILROAD.

TABLE No. 9.

An exhibit of the Grades and Horizontal Curvatures, from the east line of the State to Decatur.

No. of the grades.	Length of the grades, in feet.	Inclination of the grades per mile, in feet and hundredths.	No. of feet of straight line.	No. of feet of curved line.	Radii of the curves.	Remarks.
1	8,500	33.9	8,500	-	-	At the State line.
2	7,125	1.5	7,125	-	-	
3	6,425	26.3	6,425	-	-	
4	4,125	10.5	4,125	-	-	
5	6,800	3.8	6,800	-	-	
6	12,075	40.0	12,075	-	-	Passes Stoney creek.
7	3,559	-	2,550	1,000	3,000	To Danville depot.
8	2,002	29.0	1,002	1,000	3,000	To Vermilion river.
9	609	-	600	-	-	Passes the Vermilion river.
10	5,900	40.0	5,900	-	-	Through a deep cut.
11	2,800	24.0	2,800	-	-	
12	1,600	-	1,600	-	-	
13	1,200	34.0	1,200	-	-	
14	1,400	35.0	1,400	-	-	
15	1,200	-	1,200	-	-	
16	1,000	37.0	1,000	-	-	Over a dry prairie.
17	1,600	32.0	1,600	-	-	
18	2,800	-	2,800	-	-	
19	1,200	34.0	1,200	-	-	
20	1,200	39.0	1,200	-	-	
21	4,800	4.0	4,800	-	-	
22	5,200	10.0	1,200	4,000	9,000	To Butler's point.
23	8,200	5.2	8,200	-	-	
24	6,200	10.2	6,200	-	-	
25	23,000	-	23,000	-	-	
26	8,600	7.4	8,600	-	-	Over a dry prairie.
27	4,600	-	4,600	-	-	
28	6,700	14.0	6,700	-	-	

NORTHERN CROSS RAILROAD—Continued.

TABLE No. 9—Continued.

No. of the grades.	Length of the grades, in feet.	Inclination of the grades per mile, in feet and hundredths.	No. of feet of straight line.	No. of feet of curved line.	Radii of the curves.	Remarks.		
29	7,875	10.4	7,875	} 2,000	20,000	Over a dry prairie.		
30	5,075	3.1	5,075					
31	6,750	-	6,750					
32	15,950	2.1	15,950					
33	9,655	9.3	7,655					
34	7,400	-	7,400					
35	5,750	23.8	5,750					
36	3,325	-	3,325					
37	5,300	39.8	5,300					
38	6,300	33.5	6,300					
39	5,500	3.9	5,500					
40	3,850	23.5	3,850					
41	8,050	22.9	8,050					
42	4,450	24.9	4,450					
43	5,650	6.5	5,650					
44	10,200	22.7	10,205					
45	5,500	9.6	5,500					
46	8,150	15.5	8,150					
47	6,150	18.8	6,150			} -	-	Over a dry prairie.
48	3,350	5.2	3,350					
49	8,900	5.9	8,900					
50	24,200	3.9	24,200					
51	10,250	4.1	10,250					
52	28,000	6.7	28,000					
53	4,450	9.5	4,450					
54	5,650	-	4,650					
55	5,600	9.0	5,600					
56	11,700	7.2	11,700					
57	4,250	-	4,250					
58	7,800	39.3	7,800					
59	17,275	6.7	17,275					
60	9,350	9.1	9,350					
61	5,650	40.0	5,650	-	-	Descends to Sangamon river.		
62	600	-	600	-	-	Passes Sangamon river.		
63	3,850	37.1	3,850	-	-	Ascends from Sangamon river.		
64	4,200	25.1	4,200					
65	4,900	21.5	4,900					
66	4,500	24.6	4,500					
67	4,000	29.0	4,000	-	-	To Decatur village.		

TABLE No. 10.—Division 1, extending from the State line to Danville.

Tables No. 10, 11, 12, 13, and 14, exhibit the number and lengths of the sections on the 1st, 2d, 3d, 4th, and 5th divisions, extending from the State line to Decatur—the cubic yards of excavation put into embankment, and wasted in spoil-banks—of borrowed earth—perches of stone work—square rods of grubbing and clearing—lineal feet of bridging—wooden culverts—sundries—and the price and amount of each, and total of all.

No. of sections.	Length of the sections, in feet.	Cubic yards excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	No. of wooden culverts.	Price for each.	Amount.	Number of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding & ditching.	Total amount.
1	5,300	3,699 26	cts	\$961 74	3,458 12	cts	\$414 96	3,500 12	cts	\$420 00	-	\$	145	145	\$45 00	145	0	0	\$15 00	\$175	\$2,016 70
2	5,000	2,814 24		675 36				9,463 13		1,230 19	85	\$5	145	145	45 00	145	0	0	45 00	100	2,475 55
3	5,000	2,082 24		499 68				13,838 13		1,798 94			145	145	45 00	145	0	0	45 00	100	2,443 62
4	6,000	4,998 25		1,249 50				12,887 13		1,675 31			145	145	45 00	145	0	0	45 00	100	3,069 81
5	4,300	4,736 24		1,136 64	4,510 13		586 30	2,500 13		325 00			145	145	45 00	145	0	0	45 00	100	2,530 94
6	5,000	9,109 24		2,186 16				5,107 13		663 91			145	145	45 00	145	0	0	45 00	100	3,705 07
7	4,000	5,930 24		1,423 20	17,331 13		2,253 03	4,200 14		588 00	304	5	1,020 00	245	90 00	145	0	0	45 00	100	4,454 23
8	4,000	18,870 25		4,717 50	3,772 13		490 36	7,085 14		991 90	150	5	750 00	215	90 00	145	0	0	45 00	100	7,448 86
9	4,500	3,734 24		896 16				31,538 14		4,835 32	215	5	1,075 00	1	145	45 00	145	0	45 00	100	3,389 56
10	4,600	7,775 25		1,943 75																	8,281 07

NORTHERN CROSS RAILROAD—Continued.

TABLE No. 11—DIVISION 2, extending from Danville westerly.

No. of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding & ditching, &c.	Total Amount.
11	6,250	75,100	28	21,028 00	9,000	8	1,620 00	5,100	6½	33,150	400	26	10,400	2	75	150	500	62½	312 50	* 8,900	\$82,810 50
12	6,000	5,623	28	1,574 44	12,000	8	2,160 00	1,083 60	5	5,000	300	8	2,400	2	75	150	800	62½	500 00	† 5,500	10,968 04
13	5,400	1,197	19	227 43	3,035	12	364 20	3,020 64	5	1,404	12	168 48	1,404 12	2	75	150	100	62½	100	150	3,548 07
14	6,150	7,248	19	1,376 93	1,000	12	120 00	198 48	5	550	1,654	12	1,654 12	2	60	120	100	62½	100	100	1,961 13
15	6,090	3,100	19	589 00	1,000	12	120 00	168 48	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,007 48
16	7,257	5,810	19	1,103 90	1,000	12	120 00	168 48	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	125	2,137 38
17	4,810	2,596	19	493 24	700	12	84 00	209 64	5	2,547	12	305 64	2,547 12	2	60	120	100	62½	100	100	862 88
18	6,000	3,030	19	575 70	1,000	12	120 00	168 48	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	125	1,504 94
19	6,000	2,897	19	550 43	1,000	12	120 00	168 48	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,196 07
20	6,000	1,032	19	196 08	2,000	12	240 00	681 72	5	2,547	12	305 64	2,547 12	2	60	120	100	62½	100	100	1,438 36
21	6,000	4,666	19	886 54	2,000	12	240 00	681 72	5	2,547	12	305 64	2,547 12	2	60	120	100	62½	100	100	1,968 26
22	5,600	7,359	19	1,398 21	800	12	96 00	1,008 60	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	125	2,626 81
23	5,300	2,799	19	531 81	800	12	96 00	1,008 60	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,807 37
24	5,300	3,097	19	588 43	1,987	12	238 44	606 24	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,510 67
25	5,300	5,144	19	977 36	1,987	12	238 44	606 24	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,375 80
26	5,800	4,039	19	767 41	2,059	12	247 08	247 08	5	1,404	12	168 48	1,404 12	2	60	120	100	62½	100	100	1,354 49

* Bridge foundations, trestles and bolsters, and painting and clapboarding bridge.

† Road bridge.

TABLE No. 12—Division 3, passing Sydney.

Number of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	No. of wooden culverts.	Price for each.	Amount.	Sundries—sodding and ditching, &c.	Total Amount.
27	8,000	7,709	cts 26	\$2,004 34	-	cts 14	-	1,066	14	\$149 24	1	\$60	\$60 00	\$100	\$2,313 58
28	5,200	1,518	25	379 50	3,056	14	\$427 84	5,000	14	700 00	3	60	180 00	200	1,887 34
29	5,000	2,082	24	499 68	-	14	-	11,771	14	1,647 94	1	60	60 00	100	2,307 62
30	6,000	3,000	26	1,300 00	4,935	13	641 55	13,287	13	1,727 31	2	60	120 00	100	4,388 86
31	6,000	2,211	24	530 64	-	-	-	11,398	13	1,481 74	1	60	60 00	100	2,172 38
32	7,000	3,647	24	875 28	-	-	-	9,939	14	1,391 46	1	60	60 00	*400	2,726 74
33	5,000	3,400	26	884 00	3,200	14	448 00	6,800	14	952 00	2	60	120 00	100	2,504 00
34	7,000	4,000	25	1,000 00	-	-	-	11,307	14	1,582 98	2	60	120 00	100	3,282 98
35	5,000	2,142	25	535 50	-	-	-	10,562	14	1,478 68	2	60	120 00	100	2,234 18
36	6,000	1,820	26	473 20	4,044	14	566 16	6,000	14	840 00	3	60	180 00	125	2,184 36
37	7,000	2,814	26	731 64	-	13	-	16,448	13	2,138 24	1	60	60 00	100	3,029 88
38	6,500	6,812	25	1,710 50	1,732	14	242 48	3,972	14	556 08	1	60	60 00	100	3,059 06
39	5,000	1,866	26	485 16	-	14	-	10,953	14	1,533 42	1	60	60 00	100	2,178 58
40	5,000	2,217	25	554 25	2,000	14	280 00	4,800	14	672 00	2	60	120 00	*400	2,476 25
41	7,200	3,362	28	941 36	-	-	-	5,248	14	734 72	1	60	60 00	175	1,851 08
42	6,000	862	25	215 50	1,000	14	140 00	6,663	14	932 82	3	60	180 00	125	1,593 32
43	6,500	2,000	25	500 00	3,574	14	500 36	5,070	14	709 80	2	60	120 00	150	2,430 16

* Road crossing.

NORTHERN CROSS RAILROAD—Continued.
TABLE No. 13—DIVISION 4, located between Sadorns' grove and the timber adjacent to Sangamon river.

No. of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Number of wooden culverts.	Price for each.	Amount.	Sundries—sodding and ditching, &c.	Total amount.
44	6,000	1,732	25	\$433 00	-	cts	\$1,099 00	7,850	14	\$1,099 00	-	\$60	\$120 00	2	\$60	\$120 00	\$475*	\$2,127 00
45	5,300	1,265	25	316 25	-	16,011	14	2,241 54	14	2,241 54	-	60	60 00	1	60	60 00	150	2,451 54
46	6,000	4,887	26	1,270 62	1,266	8,255	14	1,155 70	14	1,155 70	-	60	120 00	2	60	120 00	150	1,741 95
47	5,500	399	25	99 75	1,266	4,425	14	633 50	14	633 50	90	5	\$450 00	1	60	60 00	400+	2,991 36
48	6,000	756	25	189 00	1,924	16,993	13	2,209 09	13	2,209 09	-	60	60 00	2	60	60 00	100	2,468 84
49	5,000	649	26	168 74	1,924	9,000	14	1,269 00	14	1,269 00	-	60	120 00	2	60	120 00	150	1,969 12
50	6,000	1,638	26	425 88	3,598	22,907	13	2,977 91	13	2,977 91	-	60	120 00	2	60	120 00	125	3,391 65
51	6,500	2,000	24	480 00	-	8,351	14	1,169 14	14	1,169 14	-	60	120 00	2	60	120 00	100	2,318 74
52	6,000	-	-	-	-	16,256	14	2,275 84	14	2,275 84	-	5	450 00	1	60	60 00	100	2,915 84
53	5,500	-	-	-	-	15,508	14	2,171 12	14	2,171 12	90	5	-	-	-	-	100	2,721 12
54	5,800	2,948	25	737 00	-	16,608	14	1,325 12	14	1,325 12	-	60	60 00	1	60	60 00	100	2,485 12
55	6,000	5,175	25	1,293 75	-	13,485	14	1,887 90	14	1,887 90	-	60	60 00	1	60	60 00	100	2,784 90
56	7,000	3,488	25	872 00	-	5,525	13	718 25	13	718 25	-	60	120 00	2	60	120 00	100	2,232 00
57	5,000	4,978	26	1,293 28	-	6,525	14	913 50	14	913 50	-	60	120 00	2	60	120 00	175	2,080 50
58	7,000	-	-	-	7,492	1,000	14	140 00	14	140 00	-	60	60 00	1	60	60 00	100	2,643 16
59	5,900	-	-	-	-	10,900	14	1,400 00	14	1,400 00	-	60	120 00	2	60	120 00	150	1,670 00

*Road crossing and sodding and ditching. †Grubbing and clearing.

TABLE No. 14—Division 3, extending to Decatur.

No of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per yard.	Amount.	Sundries—sodding & ditching, &c.	Total amount.	
60	6,300	1,488 25	\$372 00				\$887 12	6,824 15	1 60								1 60	\$60					\$175	\$1,494 12	
61	7,000	3,680 25	920 00				871 06	6,700 15	2 60								2 60	120					150	2,061 00	
62	6,000	2,381 25	595 25				597 87	4,599 13	3 60								3 60	180					150	1,523 12	
63	6,500	1,920 26	317 20				1,190 88	9,924 12	90 5	\$450	90 5						2 60	120					100	2,058 08	
64	7,000	2,826 26	734 76				397 15	3,055 13	2 60								2 60	60					150	1,401 91	
65	5,500	4,711 25	1,177 75				1,146 24	9,552 12	1 60								1 60	60					125	2,508 99	
66	8,000	3,000 28	840 00	\$855 12	7,126 12		1,046 50	8,050 13	100 5	500							2 60	120					200	3,001 62	
67	5,400	1,082 24	259 68				885 95	6,815 13									2 60	60					100	1,865 63	
68	6,000	1,521 24	365 04				580 45	4,465 13									2 60	120					*350	1,295 49	
69	5,000	1,948 24	467 52				985 92	7,584 13									2 60	100					*350	2,056 94	
70	7,000	6,165 26	1,602 90				1,453 24	10,381 14									2 60	100						4,185 24	
71	5,000	6,263 26	1,628 90	260 00	2,000 13		696 78	4,977 14									2 60	100						3,420 68	
72	7,000	27,936 23	6,425 74				32,991 73	194,069 17	25	\$5,000	120 5	7,200		200	25	\$5,000									56,246 47
73	7,000	11,333 26	2,946 58	353 28	2,944 12		1,260 00	9,000 14			300 44	1,350		200											6,279 86
74	5,500	1,964 26	510 64	232 20	1,935 12		813 28	6,256 13			100 4	400					2 60	100							2,056 12
75	6,000	1,747 26	454 22				2,409 68	18,536 13			14 1	580					2 60	100							3,891 40

*Road crossing. †Bridge foundations, and for trestle and bolster frames.

NORTHERN CROSS RAILROAD—Continued.

TABLE No. 15.

The Superstructure.

An exhibit of the number and lengths of the divisions—lineal feet of stringers and mud-sills—number of sleepers and keys—tons of railway iron—pounds of spikes and plates—the price and amount of each, delivered upon the road every two hundred feet—rods of rail-laying—with the price and amount, and total of all.

No. of the divisions.	Length of the divisions, in feet.	Lineal feet of string-plates.	Price per ft.	Amount.	Lineal feet of mud-sills.	Price per ft.	Amount.	Number of sleepers.	Price for each	Amount.	No. of keys.	Price for each	Amount.
1	47,600	95,200	cents. 4.6	\$4,379 20	119,000	4	\$4,760 00	10,021	cents. 16	\$1,603 36	20,042	cents. 2	\$400 84
2	93,957	187,914	4.5	8,456 13	234,892	3.8	8,925 89	19,780	16	3,161 80	39,560	2	791 20
3	103,400	206,800	5.5	11,374 00	258,500	4.5	11,632 50	21,768	20	4,353 60	43,536	2	870 72
4	93,600	187,200	5.5	10,296 00	234,000	4.5	10,530 00	19,726	20	3,945 20	39,452	2	789 04
5	100,300	200,400	5	10,020 00	250,500	4	10,020 00	21,095	16	3,375 20	42,190	2	843 80

The Superstructure—Continued.

No. of the divisions.	Tons of rails.	Price per ton.	Amount.	Pounds of spikes.	Price per lb.	Amount.	Pounds of plates.	Price per lb.	Amount.	Rods of rail-laying.	Price per rod, including the filling of track.	Amount.	Total amt.
1	198	\$100	\$19,800 00	8,766	cents. 15	\$1,314 90	3,526	11	\$387 86	2,885	\$4	\$11,540 00	\$44,186 16
2	391	100	39,100 00	17,303	15	2,595 45	6,959	11	765 49	5,693	4	22,772 00	86,570 96
3	431	100	43,100 00	19,042	15	2,856 30	7,659	11	842 49	6,266	4	25,064 00	100,093 61
4	390	100	39,000 00	17,238	15	2,585 70	6,933	11	762 63	5,677	4	22,708 00	90,616 57
5	417	100	41,700 00	18,453	15	2,767 95	7,422	11	816 42	6,072	4	24,288 00	93,831 37

RECAPITULATION OF THE NORTHERN CROSS RAILROAD.—TABLE No. 16.

The Grades and Curvatures.

No. of the grades.	Total length.	Mean inclination per mile, in feet and hundredths.	Number of feet of straight line.	Number of feet of curved line—the radii of the curves from 3,000 to 20,000 feet.
67	438,757	15.3	430,757	8,000

The Graduation.

No. of the divisions.	Length of divisions, in feet.	Cub. yds. exc. put in embankts.	Amount.	Cub. yds. wasted in spoil-bks.	Amount.	Cub. yds. borrowed earth.	Amount.	Perches of masonry.	Amount.	Lineal feet bridging.	Amount.	No. wood en culvts.	Amount.	No. of rods grubbing & clearing.	Amount.	Am't. for sundries.	Total am't.
1	47,600	63,747	\$15,689 69	29,071	\$2,744 65	93,118	\$12,528 57	654	\$3,270	—	\$540	12	\$540	6,385	\$3,292 50	\$750	\$39,815 41
2	93,957	134,736	\$2,864 91	31,532	5,042 64	74,455	10,123 20	6,210	38,700	700	\$12,800	30	1,860	1,300	812 50	15,933	118,128 25
3	103,400	53,492	\$3,620 55	23,541	3,246 39	140,284	19,228 43	490	2,450	—	—	25	1,500	—	—	2,573	42,620 37
4	93,600	29,915	\$7,580 27	14,280	4,979 96	178,799	24,577 61	180	900	—	—	23	1,380	—	—	2,575	38,992 84
5	109,200	79,269	\$19,618 18	14,005	1,700 60	310,787	48,213 89	1,935	10,480	400	6,600	21	1,170	6,428	3,214 00	4,351	95,346 67
	438,757	361,159	\$89,373 60	112,419	15,714	247,743	114,671 70	9,469	55,800	1,100	19,400	111	6,450	14,313	7,319 00	26,175	334,903 54

The Superstructure.

Total length of the road, in feet.	Lineal feet of stringers.	Amount.	Lineal feet of mud-sills.	Amount.	Number of sleepers.	Amount.	Number of keys.	Amount.
438,757	877,514	\$44,525 33	1,096,892	\$45,868 39	92,390	\$16,442 16	184,780	\$3,695 60

Superstructure—Continued.

Tons of rails.	Amount.	Pounds of spikes.	Amount.	Pounds of plates.	Amount.	Rods of rail laying.	Amount.	Total amount.
1,827	\$1,827 00	80,802	\$12,120 30	32,499	\$3,574 89	26,593	\$106,372 00	\$415,298 67

Summary of Estimates of the Northern Cross Railroad.

TABLE NO. 17.

Of the graduation - - - -	\$334,903 54 = \$4,030 20 per mile.
Of the superstructure, including the gravelling of the railway - - - -	415,298 67 = 4,997 70 per mile.
Two Depots, one at Danville and one at Decatur - - - -	16,000 00
Land, damage, and depot ground - - -	7,500 00
Engineering and contingencies connected there- with - - - -	10,000 00
	<hr/>
Total estimate of the Northern Cross Railroad, from the east line of the State to Decatur	783,702 21 = 9,431 06 per mile.

CENTRAL RAILROAD.

TABLE No. 18.

An exhibit of the Grades and Horizontal Curvatures, from Decatur to Vandalia.

No. of the grades.	Length of the grades, in feet.	Inclination of the grades per mile, in feet and hundredths.	Number of feet of straight line.	Number of feet of curved line.	Radii of the curves.	Remarks.
1	5,600	40.0	5,600	-	-	Descends to Sangamon river.
2	500	-	500	-	-	Passes Sangamon river.
3	9,300	40.0	9,300	-	-	Ascends from Sangamon river.
4	2,200	12.0	2,200	-	-	
5	4,800	16.0	4,800	-	-	Passes Springfield road.
6	5,450	3.0	3,550	1,900	6,000	Passes Shelbyville road.
7	16,000	3.5	15,500	500	6,000	
8	15,300	3.0	15,300	-	-	
9	4,700	-	4,700	-	-	
10	6,800	10.6	6,800	-	-	
11	11,800	5.3	11,800	-	-	
12	7,000	3.7	7,000	-	-	
13	6,600	3.2	6,600	-	-	Passes the summit between Decatur and Shelbyville.
14	11,600	12.2	11,600	-	-	
15	3,600	8.8	3,600	-	-	
16	6,700	15.0	6,700	-	-	
17	4,700	3.3	4,700	-	-	
18	6,800	6.9	6,800	-	-	Passes Robinson's creek.
19	7,000	5.2	7,000	-	-	Passes a branch of Robinson's creek.
20	7,750	24.1	7,750	-	-	
21	9,300	5.6	9,300	-	-	
22	7,000	12.0	7,000	-	-	
23	5,000	24.2	3,000	2,000	3,000	To Shelbyville.
24	2,200	12.0	200	2,000	3,000	
25	2,000	23.7	2,000	-	-	
26	6,200	35.5	6,200	-	-	
27	11,000	24.0	8,400	2,600	4,000	
28	4,200	36.4	4,200	-	-	Passes Robinson's creek.
29	12,000	-	12,000	-	-	
30	10,600	10.0	9,800	800	7,600	
31	7,000	15.1	7,000	-	-	
32	5,600	5.6	5,600	-	-	
33	3,900	27.0	3,900	-	-	
34	3,600	-	3,600	-	-	
35	3,600	32.3	3,600	-	-	
36	5,200	24.9	5,200	-	-	Passes Hurricane creek.
37	13,600	6.9	13,600	-	-	
38	4,000	31.7	4,000	-	-	
39	5,600	33.7	5,600	-	-	Passes Ramsay's creek.
40	3,000	29.9	3,000	-	-	
41	2,400	-	2,400	-	-	Passes Beck's creek.
42	7,400	40.0	7,400	-	-	
43	9,600	18.8	9,600	-	-	
44	8,300	26.8	8,300	-	-	
45	4,900	7.5	4,900	-	-	
46	10,900	22.3	10,900	-	-	
47	10,100	2.7	10,100	-	-	
48	7,700	12.3	7,700	-	-	
49	9,700	2.7	7,400	2,300	4,400	
50	5,100	18.6	3,800	1,300	4,400	
51	4,800	31.8	4,800	-	-	
52	2,800	5.0	2,800	-	-	
53	4,600	22.0	4,600	-	-	To Vandalia.

CENTRAL RAILROAD—Continued.

TABLE No. 19—Division 1, extending from Decatur towards Shelbyville.

Tables No. 19, 20, 21, and 22, exhibit the number and lengths of the 1st, 2d, 3d, and 4th divisions, extending from Decatur to Vandalia—the cubic yards of excavation put into embankment, and wasted in spoil-banks—of borrowed earth—perches of masonry—square rods of grubbing and clearing—lineal feet of bridging—wooden culverts—the price and amount of each, and the total of all.

No. of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding and ditching, &c.	Total amount.
1	4,500	10,660 24	cts	\$2,558 40	-	-	-	90,947 14	cts	\$12,718 58	70	\$5	\$350	-	-	\$30	1	1 60	-	735 50	cts	\$367 50	\$-	\$16,051 48
2	5,000	62,330 24	-	14,959 20	-	-	-	70,189 14	-	9,816 46	1,200	5	6,000	200 25	\$5,000	-	-	-	-	1,470 50	cts	735 00	*2,500	41,720 66
3	6,000	16,480 24	-	3,955 20	8,125 12	\$975 00	-	5,545 12	-	665 40	200	5	1,000	-	-	120	2	60	-	1,176 50	cts	588 00	-	6,518 20
4	7,000	2,330 25	-	582 50	2,000 13	269 00	-	40,685 12	-	4,882 20	650	5	3,250	-	-	120	2	60	-	-	-	-	-	1,727 90
5	6,000	-	-	-	-	-	-	4,399 12	-	551 88	-	-	-	-	-	120	2	60	-	-	-	-	-	8,232 20
6	6,000	3,361 25	-	840 25	3,000 13	390 00	-	8,114 12	-	973 68	-	-	-	-	-	120	2	60	-	-	-	-	-	2,052 13
7	5,000	2,660 25	-	216 50	-	-	-	7,688 12	-	922 56	-	-	-	-	-	120	2	60	-	-	-	-	-	1,460 18
8	5,000	2,196 25	-	549 00	3,000 13	390 00	-	3,257 11	-	358 27	-	-	-	-	-	60	1	60	-	-	-	-	-	1,807 56
9	7,000	1,239 24	-	311 76	-	-	-	7,681 12	-	921 72	-	-	-	-	-	60	1	60	-	-	-	-	-	1,457 27
10	6,000	2,110 25	-	527 50	1,000 13	130 00	-	7,442 12	-	893 04	-	-	-	-	-	60	1	60	-	-	-	-	-	1,393 48
11	6,000	2,500 25	-	625 00	2,616 13	330 48	-	7,489 12	-	897 60	-	-	-	-	-	60	1	60	-	-	-	-	-	1,710 54
12	7,000	2,000 24	-	480 00	2,336 13	393 68	-	6,229 12	-	746 40	-	-	-	-	-	60	1	60	-	-	-	-	-	2,033 08
13	6,000	1,730 24	-	415 20	-	-	-	5,543 12	-	665 16	-	-	-	-	-	60	1	60	-	-	-	-	-	1,690 08
14	6,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	1	60	-	-	-	-	-	1,240 36

* Bridge foundations and trestles.

TABLE No. 20—Division 2, extending to Shelbyville.

No. of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding & ditching.	Total amount.
15	5,000	1,165	24	279 60	1,000	13	\$1,004 90	-	-	-	1	65	\$65 00	-	-	-	\$200	\$1,614 50
16	5,000	1,640	25	410 00	-	13	855 40	-	-	-	2	65	130 00	-	-	-	125	1,455 40
17	5,000	2,110	25	777 50	-	13	1,147 90	-	-	-	1	65	65 00	-	-	-	175	2,230 40
18	5,000	-	-	-	-	12	1,497 00	-	-	-	1	65	65 00	-	-	-	100	1,662 00
19	6,000	6,643	25	1,660 75	-	13	1,047 72	-	-	-	1	65	65 00	-	-	-	175	2,948 47
20	6,000	1,596	24	383 04	-	13	828 62	-	-	-	1	65	65 00	-	-	-	100	1,376 66
21	5,000	2,520	28	705 60	-	14	393 40	-	-	-	1	65	65 00	-	-	-	200	1,364 00
22	5,000	1,500	25	375 00	-	12	2,016 24	230	\$5	\$1,100	1	65	65 00	1,205	50	\$602 50	-	4,093 74
23	5,500	2,966	26	771 16	-	11	779 80	-	-	-	2	65	130 00	441	50	220 50	-	1,901 46
24	6,000	-	-	-	-	11	330 08	250	5	1,250	-	-	-	-	-	-	200	4,580 08
25	7,000	2,488	25	622 00	-	13	968 80	-	-	-	2	65	130 00	617	50	308 50	-	2,029 39
26	5,000	2,000	25	500 00	1,165	13	778 31	-	-	-	2	65	130 00	-	-	-	150	1,709 76
27	6,000	6,220	24	1,492 80	-	12	858 48	200	5	1,000	-	-	-	-	-	-	150	3,501 28
28	6,000	5,620	24	1,348 80	-	13	1,272 05	-	-	-	2	65	130 00	514	50	257 00	-	3,007 85
29	5,500	6,464	24	1,551 36	-	13	1,862 61	275	5	1,375	2	65	130 00	1,617	50	808 50	-	3,727 50

CENTRAL RAILROAD—Continued.

TABLE No. 21—Division 3, extending from Shelbyville towards Vandalia.

Number of the sections.	Length of the sections, in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	No. of wooden culverts.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per rod.	Amount.	Sundries—sodding and ditching.	Total amount.
30	5,000	1,866 25	<i>cts</i>	\$466 50	-	-	-	4,764	12	\$571 68	-	50	\$100	-	50	\$100	-	45	\$291 15	\$300	\$1,338 18
31	6,300	9,885 26	-	2,570 10	-	-	8,773	12	-	1,052 76	-	75	150	2	75	150	1,117 50	50	558 50	100	4,104 01
32	5,900	10,998 25	-	2,749 50	3,612	12	\$433 44	-	-	-	250	\$5	\$1,250	1	50	50	882 50	50	441 00	100	6,236 72
33	5,900	5,353 25	-	1,338 25	-	-	23,519	13	-	3,057 47	-	-	-	3	75	225	1,360 50	50	680 00	125	3,976 95
34	5,600	7,464 25	-	1,866 00	-	-	8,315	13	-	1,080 95	-	-	-	3	60	180	1,176 50	50	588 00	150	2,327 12
35	6,200	4,976 25	-	1,244 00	-	-	1,376	12	-	1,65 12	-	-	-	4	60	240	1,360 50	50	680 00	150	2,454 89
36	5,900	4,147 25	-	1,036 75	-	-	2,678	13	-	348 14	-	-	-	2	60	120	-	-	-	150	2,893 40
37	7,300	5,355 26	-	1,322 30	-	-	9,470	13	-	1,231 10	-	-	-	2	60	120	-	-	-	175	1,465 56
38	6,800	1,151 26	-	299 26	2,000	12	240 00	5,010	13	651 30	-	-	-	2	60	120	-	-	-	175	2,962 02
39	6,800	3,732 25	-	933 00	-	-	7,951	13	-	1,034 02	-	-	-	2	60	120	-	-	-	100	5,737 82
40	6,700	9,693 26	-	2,520 18	-	-	13,522	12	-	1,622 64	200	5	1,000	2	60	120	750 50	50	375 00	100	5,737 82
41	6,700	3,966 76	-	1,031 10	-	-	10,391	12	-	1,247 28	-	-	-	1	60	60	370 50	50	185 00	150	2,673 44
42	4,600	9,550 74	-	2,292 00	-	-	20,444	12	-	2,453 28	320	5	1,600	2	60	120	1,323 50	50	661 50	-	7,126 78
43	6,700	1,000 15	-	250 00	2,031	13	264 03	5,580	13	725 40	-	-	-	1	60	60	206 50	50	103 00	150	1,552 43
44	7,200	5,752 26	-	1,495 52	3,000	13	390 00	-	-	-	-	-	-	3	50	150	1,375 50	50	687 50	-	2,723 02

CENTRAL RAILROAD—Continued.
TABLE No. 22—DIVISION 4, extending to Vandalia.

No of the section.	Length of the sections in feet.	Cubic yards of excavation put into embankments.	Price per yard.	Amount.	Cubic yards wasted in spoil-banks.	Price per yard.	Amount.	Cubic yards of borrowed earth.	Price per yard.	Amount.	Perches of masonry.	Price per perch.	Amount.	Lineal feet of bridging.	Price per foot.	Amount.	No. of wooden cut-tings.	Price for each.	Amount.	No. of rods of grubbing and clearing.	Price per yard.	Amount.	Sundries—sodding & ditching, &c.	Total amount.
45	6,600	5,621 26	\$1,461 46					21,874 12	\$2,624 86								275	\$ 150		764 50	\$382 00	\$50	\$4,668 34	
46	5,800	18,488 24	4,437 12					10,252 13	1,332 70		300 5	2,800	\$1,500	2,800	7	\$19,600			1,065 50	853 00	50	37,772 88		
47	7,900	26,430 25	6,607 50					10,221 12	1,226 52		250 5		1,350						1,176 50	588 00	100	9,772 02		
48	6,700	15,120 26	3,931 20					7,950 12	846 00										1 90	294 50	147 00	100	5,114 20	
49	6,800	2,629 26	683 54					6,442 13	837 46										1 60	61	1,676 50	838 00	50	2,829 00
50	6,800	4,350 24	3,444 00					15,000 13	1,950 00	300 5			1,500	800	7	5,600				1,176 50	588 00	50	13,132 00	
51	7,300	20,551 24	4,932 24					5,032 13	654 16										2 80	160	353 50	176 50	*500	6,406 90
52	5,400	16,932 25	4,333 00					11,145 12	1,337 40										2 60	120	700 50	353 00	150	2,912 50
53	6,800							16,354 14	2,289 56										2 60	120	1,382 50	691 00	100	3,866 97
54	7,300	6,256 25	1,562 50					10,719 13	1,393 47										3 60	180	882 50	441 00	100	2,853 79
55	7,300	7,708 25	1,927 00	205 79				16,442 12	1,973 04		300 4		1,200						2 60	120	294 50	147 00	100	3,955 72
56	6,400	1,732 24	415 68					17,448 13	2,268 24										3 75	225	1,470 50	735 00	50	4,878 74
57	6,000	6,402 25	1,600 50					4,372 14	612 08										2 60	120	294 50	147 00	150	2,336 33
58	5,400	3,663 25	917 25	390 00				30,101 13	3,913 13		280 5		1,400							441 50	220 50	150	7,482 91	
59	5,600	7,497 24	1,799 28																					

*Changing the course of Ramsay's creek, and sodding and ditching.

CENTRAL RAILROAD—Continued.

TABLE No. 23.

The Superstructure.

An exhibit of the number and lengths of the divisions—lineal feet of stringers and mud-sills—number of sleepers and keys—tons of rail-way iron—pounds of spikes and plates—the price and amount of each, delivered upon the road every two hundred feet—rods of rail-laying—with the price and amount, and total of all.

No. of the divisions.	Length of the divisions, in feet.	Lineal feet of stringers.	Price per ft.	Amount.	Lineal feet of mud-sills.	Price per ft.	Amount.	Number of sleepers.	Price for each cents.	Amount.	No. of keys.	Price for each cents.	Amount.
1	82,500	165,000	4.9	\$8,085 00	204,250	4	\$8,170 00	17,369	14	\$2,432 66	34,738	2	\$694 76
2	83,000	166,000	5.2	8,632 00	207,500	4.1	8,507 50	17,474	17	2,970 58	34,948	2	698 96
3	93,600	187,200	5	9,360 00	234,000	4	9,360 00	19,705	15	2,955 75	33,410	2	788 20
4	98,000	196,000	5	9,800 00	245,000	4	9,800 00	20,131	14	2,818 31	41,262	2	825 24

The Superstructure—Continued.

No. of the divisions.	Tons of rails.	Price per ton.	Amount.	Pounds of spikes.	Price per lb.	Amount.	Pounds of plates.	Price per lb.	Amount.	Rods of rail-laying.	Price per rod, including the filling of track.	Amount.	Total amt.
1	345	\$100	\$34,500 00	14,431	15 cents.	\$2,164 65	6,111	11	\$672 21	5,000	\$1	\$20,000 00	\$76,718 28
2	346	100	34,600 00	15,384	15	2,292 60	6,148	11	676 28	5,030	4	20,130 00	78,497 92
3	390	100	39,000 00	17,238	15	2,585 70	6,333	11	762 63	5,672	4	22,638 00	87,500 28
4	408	100	40,800 00	18,044	15	2,706 60	7,259	11	798 49	5,939	4	23,756 00	91,304 67

RECAPITULATION OF THE CENTRAL RAILROAD.—TABLE No. 24.

The Grades and Curvatures.

No. of the grades.	Total length.	Mean inclination per mile, in feet and hundredths.	Number of feet of straight line.	Number of feet of curved line—the radii of the curves from 3,000 to 7,600 feet.
53	357,100	15.4	343,700	13,400

The Graduation.

No. of the divisions.	Length of the divisions, in feet.	Cub. yds. excavated to embankt.	Amount.	Cubic yards wasted in spoil-banks.	Amount.	Cubic yards of borrowed earth.	Amount.	Perches of masonry.	Amount.	Lineal feet of bridging.	Amount.	No. of wooden culverts.	Amount.	No. of rods of grubbing & clearing.	Amount.	Amount for sundries.	Total amt.					
1	82,500	110,422	\$26,685	51	22,157	\$2,799	16	265,290	\$35,022	95	2,750	\$10,600	500	\$7,700	15	\$900	3,381	\$1,630	50	\$3,700	\$89,098	12
2	83,000	43,932	10,877	61	2,165	281	45	146,693	18,441	43	945	4,725	17	1,105	4,394	1,375	39,202	2,197	00	1,575	39,202	49
3	93,600	84,888	21,484	52	10,643	1,327	47	121,799	15,241	14	770	3,850	32	1,965	10,566	5,250	50,993	5,250	65	1,875	50,993	78
4	98,000	153,379	37,952	27	7,583	955	79	182,452	23,258	76	1,430	6,850	22	1,465	13,496	6,748	107,829	6,748	00	1,800	107,829	76
	357,100	392,621	96,999	91	42,548	5,363	87	716,234	91,964	22	5,895	26,025	86	5,435	31,837	15,886	15	287,124	15	8,950	287,124	15

The Superstructure.

Total length of the road, in feet.	Lineal feet of stringers.	Amount.	Lineal feet of mud-sills.	Amount.	Number of sleepers.	Amount.	Number of keys.	Amount.
357,100	714,200	\$35,877 00	892,750	\$35,837 50	75,179	\$11,176 33	150,358	\$3,007 16

Superstructure—Continued.

Tons of rails.	Amount.	Pounds of spikes.	Amount.	Pounds of plates.	Amount.	Rods of rail laying.	Amount.	Total amount.
1,483	\$148,900 00	64,997	\$9,749 55	26,451	\$2,909 61	21,641	\$86,564 00	\$334,021 15

Summary of Estimates of the Central Railroad.

TABLE No. 25.

Of the graduation - - - -	\$287,124 15 =	\$4,245 12 per mile.
Of the superstructure, including the gravelling of the railway - - - -	334,021 15 =	4,938 38 per mile.
Depot at Vandalia, and for enlargement of the depots at Shelbyville and Decatur - - -	18,000 00	
Land, damage, and depot ground - - -	6,000 00	
Engineering and contingences connected there- with - - - -	10,000 00	
Total estimate of the Central Railroad, from Decatur to Vandalia - - - -	655,145 30 =	9,686 68 per mile.

I have now given the results of the surveys authorized by the Legislature in the eastern engineering district. The locations must be regarded as approximate; and although the definite lines will differ but little from them, yet by careful locations of bridges and accurate adjustments of grades, the expense of construction can be materially reduced.

The estimates are based on the cost of labor and materials at the present time, and the prices for which a portion of the work has been contracted, and cannot fail, by judicious management, to cover the expense of constructing the roads. In some instances it may be advisable to change the manner of construction, to conform to the resources of the country as developed in the progress of the works; and, should there be much difficulty in procuring suitable rock for constructing stone culverts, I would recommend cast-iron pipes to be substituted. Doubtless many other changes, both judicious and economical, can be made, the utility of which time can alone determine.

The plans and profiles are compiled from actual surveys, and, by referring to the explanatory tables annexed to them, can be readily comprehended.

Allow me, ere I close this report, to tender to the acting Commissioner under whose directions the surveys have been made, and to your honorable Board, my thanks for the confidence reposed in my integrity and judgment; and, hoping it contains all the information desired,

I am, gentlemen, with much esteem,

Your obedient servant,

ARTHUR W. HOYT,

Engineer for the Eastern Engineering District, State of Illinois.

REPORT
ON
THE JOINT IMPROVEMENT
OF THE
WABASH RIVER.

JANUARY 25, 1839.

Read, laid on the table, and ordered to be printed with the Report of the Commissioner
of the Fourth Judicial Circuit.

VANDALIA, *January 25, 1839.*

To the Hon. the SPEAKER

of the House of Representatives.

SIR: In obedience to a resolution of the House of Representatives, and in accordance with the promise in my communication to your body of the 15th instant, I herewith transmit a copy of the report of D. Burr, Esq., principal engineer of the States of Indiana and Illinois, on the Great Wabash river improvement. From a thorough examination of this able document, the practicability and utility of a vigorous prosecution of the improvement will not be doubted: and as that river meanders several hundred miles through the most rich and fertile country in the valley of the Mississippi, rapidly populating with an industrious and enterprising part of the community, it is useless to recommend that the Hon. the Legislature of Illinois would adopt efficient measures to effect the speedy completion of a work so conducive to the interest and prosperity of both this State and that of her sister, Indiana.

I have the honor to be, sir,

Very respectfully,

Your obedient servant,

WILLIAM KINNEY,

President B. P. W.

General M. K. ALEXANDER,

Acting Commissioner of the Fourth Judicial Circuit.

SIR: After long delay, on account of ill health, I herewith submit a report of the operations on the Wabash, under my charge, during 1838.

Respectfully,

D. BURR,

Principal Engineer Wabash River.

MOUNT CARMEL, *January 16, 1839.*

MESSRS. THOMAS H. BLAKE and M. K. ALEXANDER,

Commissioners of the States of Illinois and Indiana.

GENTLEMEN: The delivery of the stone for the lock and dam at the Grand rapids of the Wabash was contracted for in November, 1837, with Messrs. Wilson & Co., and Chapman & Co., to have been completed by the first of June last. The same persons constituted the two firms or companies, and agreed to deliver 3,500 cubic yards of stone each, at \$8 33 $\frac{1}{3}$ and \$8 25 per cubic yard.

They procured a steamboat and twelve flatboats, 80 feet long by 18 feet wide. The time taken to build these consumed so large a portion of the spring floods, that, with failure and unexpected difficulties at the quarry, they delivered only 820 yards.

On the 22d of August the dam and lock were let in separate contracts, the former to Messrs. Baker, Riley & Co., the latter to William Mudge. The terms of the letting stipulated that the contractors for the lock should take the quantity of stone, delivered at the site, at the same price which had been paid for them by the States. Proposals were received for separate prices for the masonry in the lock and abutment, based on the contingency of the stone used in their construction being procured from a quarry in the upper part of Martin county, from the quarry at Portersville, and from the quarry at Petersburg, all of which are situated on White river, at the distance of 50, 80, and 135 miles from the site of the works.

The prices at which the contracts have been taken have exceeded the estimate originally suggested as the probable cost of the works, owing to the known probability of quarries, in this part of the country, becoming of little or no value after they are worked back a short distance into the earth, and from a change of plan in having the masonry laid in hydraulic cement instead of mortar and grout formed of common lime, as originally contemplated, which increases the expense something over 10,000 dollars.

It is intended to procure limestone from the quarry in Martin county, which is of the best kind, for the faces of the walls of the lock and abutment and for headers which constitute their bond; and for their interior portions which will be shielded from frost and sudden alternations from heat to cold, to use the sand stone in the vicinity of the works, which is of a tolerable quality, can be cheaply obtained, and which, in the places where it will be used, will be permanent—and in that manner to keep the cost of the works within the gross sum of \$185,000

It was not deemed expedient to permit the timber for these works to be cut before the 15th of December. Messrs. Baker, Riley, & Co., are making contracts for the deliveay of the timber for the dam.

Mr. Mudge, contractor for the lock, has opened the quarries, keeps a small force at work at them, is contracting for boats, and making preparations for the progress of his work with the first rise of the waters and the opening of the spring. No money has been paid on the new contracts, or materials been delivered under them.

In accordance with your instructions to survey the Wabash river from the Grand rapids to its mouth, and, in the event of its impracticability or inexpediency for improvements for uninterrupted steamboat navigation by continuous locks and dams, to survey a canal route from New Harmony, on the Wabash, to Mount Vernon on the Ohio river, a party was organized on the 8th of September to perform that service, and entered immediately after on their labors in the field.

The obstructions to the navigation are the rocky bars extending across the bed of the river at the points of its greatest descent; flat sundry shoals, where the volume of the river is distributed over a large area of surface and diminished in depth; and not the least difficult or hazardous are the snags, old trees and stumps imbedded in the channel in many places, but more especially in the Piankeshaw bend, in the bend below Fox river, in the bend below the Little Chain, in Black's cut-off, and in the first three miles of the Wabash next the Ohio.

The rock bars are—

First. The shoals immediately below the mouth of White river; fall one foot nearly in five hundred feet in length, and affording two feet water over the highest rocks.

Second. The Coffee island rapids, descent, in half a mile, three feet—the Island chute, on the Indiana side, having but one foot water over the rocks in the steamboat channel.

Third. Warrick's ripple. Here the water falls one foot in the length of five hundred feet, and runs with accumulated velocity over an uneven bed of sand stone rock, the points of which impede the passage of boats, and render the channel crooked and difficult to keep. The highest points of rock are within one foot of the surface in low water, and although one or more channels of two feet, and of sufficient width for any boat, may be found, the serpentine course they pursue, with the strength of the current, requires an intimate knowledge and much skill of the navigation to pass boats safely of that draught.

Fourth. The Grand Chain, seven miles by the river below Warrick's ripple, forms the next obstruction, and, after Coffee island, the most serious from White river to the Ohio. At the stage of water when the exploration was made, the descent was four feet fall in the distance of four hundred feet. The water runs this distance along the pier erected by Messrs. Gardner and Mundy with great violence, and has a depth from two to four feet, except a single rock in the channel, presenting a surface of about twelve feet square, on which there was one foot five inches water.

Fifth. The Little Chain, five and one-half miles below the Grand Chain, by the river, is the last of the rock bars of the Wabash. Detached rocks render the channel crooked, but boats are seldom injured or de-

tained at this point. The water runs with a strong current, and is two and a half feet deep—descent two feet in one-fourth of a mile. The excavation of a small quantity of separated masses of rock to straighten the channel, and the removal of a few detached rocks, is all that is necessary to overcome the obstacles presented at this point.

There was no sand-bar or shoal composed of gravel and sand in the Wabash river, when the examinations were made, which did not afford two feet depth of water over spaces wide enough for the egress of boats; and from the unusual prevalence of drought the river cannot reasonably be expected to be found in a lower stage.

The locations of the sand-bars are—First: A sand-bar between Graysville and New-Harmony, opposite Black's and head of Fox river. Second: Gravel and sand-bar, short distance below the head of New-Harmony cut-off. Third: Wincler's bar, near the foot of the cut-off, formed of light sand. Fourth: Sand and gravel bar one and a half miles below the Grand Chain. Fifth: Sand and gravel-bar at Wright's, above mouth of Little Wabash. Sixth: Skidmore's bar, composed of sand, three miles above the mouth of the Ohio.

On no other points would there have been difficulty in navigating boats of two and a half and probably of three feet draught.

Some laws, or general principles, appear to govern the deposition of the sand and earthy matter throughout the whole extent of the river.

In portions of it where the bed is serpentine, as compared with its general direction—where the current near the bottom of the river, in floods, is forced by the direction of the banks to pursue courses varying and diverging from the general course of the current near the surface, which, by overflowing the banks, moves in a straighter direction—the revulsion of the water against the banks near the bottom, by communicating a boiling agitation to the great mass of the current, operates with so much effect on the light material of the bed of the river, that, in all such portions, the Wabash has a depth from six to ten feet. Shoals are nowhere found in the bends of the river nor where its width is compressed into less than 700 feet.

Large quantities of sand and earth are carried down in the floods and deposited on the bars. The abrasion of the banks takes place at the bottom of bends where they stand perpendicularly to the surface. Sloping banks do not wash. Bars that are formed on one side of the river, and which are slightly elevated towards the bank, become places of deposite for the sand and earth removed in floods.

Wherever the water runs over a bed inclined towards one of its banks, the bank so situated is operated on by the water lying against it in a wedge-like shape; the bottom is then undermined—the incumbent mass falls in; and as the specific gravity of the alluvial formation of the banks exceeds but slightly that of the water, it is easily removed to the place where it subsides.

Those bars which, from any cause, obtain but a slight elevation on the side next the shore, increase rapidly in height and size. The highest bars receive the largest additions of the annual deposits, and appear as if they must increase in size and encroach on the opposite bank until, in their turn, they will be cut off by the bends above and below them.

The channels on the flat sandy bars change frequently from one side

to the other of the river, but seldom change position in the direction of the stream. The bars near the head of the Harmony cut-off, at Wincler's, at the mouth of Little Wabash, and at Skidmore's, although wholly formed of sand and gravel, have been situated on their present positions since the navigation of the river has been known. The shape of the banks govern the deposits which form the bars; in other places and parts of the river, the floods wash out and keep clear channels of greater depth.

These principal constituents of the character of the Wabash, are believed to be well defined, easily ascertained, and such as present themselves to an ordinary observer.

It remains to add that this portion of the Wabash is navigable for boats drawing five to six feet, in ordinary seasons, for six months in the year, (from December to the first day of June;) and in that period it is frequently navigated by the largest boats which are used on the Ohio. And in relation to the prominent features of the country through which this portion of the Wabash extends—that its immediate valley is from three to seven miles wide, of low rich land of the lightest kind of alluvial soil, mostly overflowed in the annual spring floods, and occasionally interspersed with ponds, marshes, bayous, and ancient river beds. Through this valley the river pursues a serpentine course, forming a series of circuitous bends, which alternately approach the high plateau formed by the general level of the country on each side of the valley. Across these bends, cut-offs are formed in some places of many miles in extent, through which, as at Fox river, New Harmony, the Little Chain, and Black's cut-off, the river continually flows, discharging no inconsiderable portion of its volume, and diminishing the depth of its waters on its own bed. The plateau of high land is washed at its base, on the Illinois side, at Mount Carmel, at Coffee island, at M'Creary's bluffs, and at the Little Chain. On the east side, the high lands only reach the Wabash at New Harmony and the Grand Chain. The banks of the Wabash to the Little Chain are ordinarily twenty-one feet in height above low water. The spring floods usually reach near their tops, and, at intervals of a few years, they rise six or seven feet over them; so that the greatest difference between high and low water is about twenty-seven feet. Below the Little Chain, the floods of the Ohio influence the current, banks, and bars of the Wabash; the banks are higher, and in times of the greatest rises of water more deeply overflowed. The sand-bars are more frequent and are less in conformity with the principles which appear to govern their deposition in the upper portion of the river; although there is not such a departure from them as would warrant a difference in the plans of improvement which might be adopted to overcome the impediments they oppose to the navigation of the river. The line of high water mark below the Little Chain increases from 27 to 50 feet. The cut-offs appear to be easily susceptible of enlargement, as at Black's, where, by burning and clearing away the drift at the head, and clearing the timber from the banks a few years since, by Messrs Gardner and Mundy, nearly the whole volume of the river passes through it, and the old channel is becoming dry and rapidly filling up with sand. No evidences of cut-offs being recently formed have been ascertained.

	Distance—miles.	Descent—feet.
The descent of the Wabash from the foot of the		
Grand rapids to the foot of White river rapids	- 1.75	- 1.47
To foot of Coffee island rapids	- 5.75	- 1.48
foot of Coffee island rapids	- 1.00	- 3.09
mouth of Black river by the Big bayou, 18½ by the		
Wabash	31	14.33
head of cut off at New-Harmony	3.33	0.17
foot of do by cut-off two miles by river	11.00	6.00
Warrick's ripple	2.50	0.22
foot of do.	1.00	0.84
head of Grand Chain	7.00	0.69
foot of the Grand Chain	0.50	3.86
head of the Little Chain	5.00	1.14
head of Black's cut-off	1.33	3.39
foot of do.	1.50	2.41
head of Wright's bar	3.00	2.57
foot of do.	1.25	1.29
head of Skidmores' bar	10.33	7.71
foot of do.	1.00	1.09
mouth of the Wabash	2.50	6.19
	<hr/> 90.74	<hr/> 57.94

The peculiar elements in the character of the lower valley of the Wabash, in its light alluvial soil, great extent of country overflowed, large amount of deposit carried along its current in floods, and liability to change its bed, especially if the current to any considerable extent should be impeded, preclude, it is believed, the plan of slacking the current of the river by a continuous series of dams, locks and pools; the liability of the latter to become so filled with sand as to force the waters into a new channel, and leave the works on dry land, is too great to warrant their construction. An examination of the river will hardly fail to convince the most sceptical that there are not many places in the Wabash from White river to the Ohio, in which the sand is deposited so as to form shoals in the river; these occur only under projecting points, and on the lower terminations of long straight reaches, and that where the whole volume of the river is reduced to 6 or 700 feet in width. On a sand or gravel bar, there is always a sufficient depth of water, and further, that although the channels over these sandy bars or shoals are changing always from side to side of the river, they seldom change in the direction of the stream. Sand bars were known at the principal points where they are now situated from the earliest knowledge of the country. Such being the fact in relation to the valley of the Wabash, to obtain a sufficient depth of water on the sandy shoals of the river, the plan of narrowing the channel seems to be pointed out as an efficient remedy. The same mode is proposed for the rock-bars at the mouth of White river, Coffee island, and at Warrick's ripple, only narrowing the bed of the river in a ratio to its fall, so that with the removal of detached rocks, projecting points, and a slight excavation of others which lie in place, three feet water may be obtained.

At the Grand Chain, surveys for a canal across the narrow point of land were made to form a channel for the river which would avoid the rocky bar of the current. Surveys were made for wing-dams also, but on the mature comparison of costs and results, excavating a channel for a short distance beside the pier erected by Messrs. Gardner and Mundy, was supposed to be cheapest and best adapted for that object in view.

The water fell 4 feet in the length of 500, at the extreme low stage of the river, when the examinations were made. The rock over which this descent occurs, extends about 500 feet up and down the stream, and at each extremity breaks abruptly into deep water. Over this ledge of rock the current runs with great violence, and has a channel partially excavated beside the pier, varying in depth from two to four feet, except on a single point of rock towards the upper part of the excavation, which has not more than seventeen inches on its surface.

The pier referred to was built by Messrs. Gardner and Mundy, Commissioners of Indiana and Illinois, is a strongly framed series of wooden cribs of square timbers filled with stone, 900 feet long, 10 feet wide, and supposed 9 feet high. A channel in the rock was partially excavated, but, owing to a rise in the waters, the excavation on the up stream side of the rock was not completed.

The plan proposed is to excavate a channel $3\frac{1}{2}$ feet deep into the upper part of the rock, and 75 feet wide, to diminish the fall and lessen the velocity of the current. No injurious effects are apprehended of lessening the depth of water at Warrick's ripple, the first shoal seven miles above. The river is deep between those places, and the quantity of water flowing in the Wabash is too great to be influenced that distance by an excavation of much greater dimensions.

The levees or wing-dams will be formed of timber bolted to the rocks, and filled with stone in all places where rock foundations can be found, similar to those erected by Messrs. Gardner and Mundy. On such positions as have sand and gravel foundations, small trees and brush in the first place will be laid, closely packed, two feet thick, and extending two feet on each side beyond the embankment. On this a bank of gravel 6 feet wide at top, with slopes of one and three quarters feet to one of perpendicular rise, will be laid and carried up within two feet of the required height of the embankment; over the gravel, a course of rubble stone protection, covering every part of it, will be placed 2 feet thick to preserve the gravel from the effects of the current and floods. The levees or wing-dams will be built of sufficient length to have their direction parallel with the course of the current, so as to oppose the least resistance to its motion, and consequently present the least hazard for boats to lodge on and receive injury from them. They are planned to give a minimum depth of three feet, and to rise from 1 to 2 feet above the lowest stage of the water, for security against ice-floods, as well as to present the least impediments to boats in the ordinary navigable stages of the water.

In devising modes for the effectual navigation of the Wabash, some difficulty occurs in determining the depth of water which shall be provided for that purpose. For three months in the year, there is not commonly in the Ohio river, above and below its confluence with the Wabash, for boats over the bars, more than from 2 to $2\frac{1}{2}$ feet water, and this

	Amount brought forward,	\$193,107 51
4,922	feet wing-dam at Skidmore's bar	17,368 34
	Removing snags, (including boats and machinery)	18,880 00
	Short dams across the head of Fox river bayou, and bayou at head of Little Chain, supposed to cost each \$3,500,	7,000 00
		<hr/>
		\$236,355 85
	Add 25 per cent. for risk, uncertainty of river, and superintendence,	59,088 96
		<hr/>
		<u>\$295,444 81</u>

On the other portions of the river, there was water sufficient for boats of 3 feet draught, but unless the river should be leveed in its whole length, and its banks compressed into narrower bounds, a navigation of more than 3 feet cannot be obtained. Confidence is felt that wing-dams or levees so constructed that they will oppose the current but slightly, will be permanent, or at least preserve their position and utility for a long period.

This opinion is strengthened by the facts, that where the current is rapid, piers of timbers bolted to the rocks will be used, and the embankments will be formed at places where the current will be gentle and where there is a tendency already for the deposition of the sands; logs lodged on the bars are seen nearly buried, the water neither washing on their lower sides, nor under them; nor have the wing-dams, piers, or rubble walls placed in the river by Messrs. Gardner and Mundy a few years since, been removed.

The question naturally suggests itself, that if the sand and earth be washed out of the channels by these wing-dams, new deposits will be formed immediately below them, equally as injurious as those which are proposed to be remedied. The formation of the bars appears to depend on the shape of the banks; and where these are so situated that they now influence the waters to scoop out, and keep clear, sufficient channels—their form, the light material of the bed of the river, with the ease with which it is moved, are relied on to continue the same effects until the relative position of the banks are essentially changed; which is not often brought about by sudden transitions, but ordinarily is the work of time.

The general outlines of rivers are slowly changed, and the causes which influence the deposition of the earth and sands moved by their currents, still more so. For where bars were forming on one side, and the perpendicular bank on the opposite shore was washing away, the inclined plane of the bed of the river in its transverse direction, which is necessarily maintained during that operation, would always preserve a sufficient depth of water under the washed shore, and must so continue until new bends were formed. It therefore follows that the same causes which influence a current to deepen particular places, though not entirely permanent, (as nothing depending on the banks and beds of rivers strictly can stand in that relation,) they are nevertheless subject only to gradual changes, too slow in their progress to afford a reasonable ground to abandon a plan of improvement for objections based alone on that consideration.

To confine the banks of streams within narrower beds than they form for themselves, is no new operation in the history of the transactions of man. Rivers which overflow their banks, as they become densely settled, are uniformly leveed to reclaim low grounds and prevent the expansion of floods. Experience proves that artificial levees, made in a very ordinary manner, confine the waters of rivers with as much certainty, and with no greater expense, than waters are confined within the banks of a canal. Artificial embankments are the improvements which ultimately obtain on all rivers having a dense population on rich overflowed lands. Such has been the condition of the Nile from time immemorial—the condition of the Po and Adige of Italy, for centuries past—the condition of nearly all the rivers in Europe, and of the Mississippi, and partially so of many others in the United States. The improvement for deepening the channel of the Hudson near Albany is of this character, and has been persevered in for years. Embankments for leveeing rivers have been very permanent, and have resisted, with success, those varying changes which rivers in their natural state constantly undergo.

It is not overlooked that the experience of the country in many places is against the use of wing-dams for the improvement of rivers; and where they have been erected with reference only to deepening particular bars, so soon as these have been washed away, others have frequently been formed above and below them; and when constructed so as to much oppose the course of the current, the water has dammed on the upper side, and in falling over undermined the lower, occasioned breaches, partially destroying the works, leaving portions of them standing their full height to the hazard of boats in medium floods. These objections are entitled to great weight, and it must be admitted that, on the western waters, where much of the trade is carried on in flatboats coming from long distances, in which, from the nature of the business, pilots cannot be employed, nor the navigators intimately acquainted with the country or the river, the natural beds of the streams, in half floods, are better than any plan of improvement which can be devised; but as the great object of improvements is to provide for the dry seasons of the year, this objection must yield to that higher consideration. It is with due deference submitted, that, on the plan of improvement proposed, these objections lose much of their force from the great length of the works erected with direct reference to the shape of the banks and course of the currents, which secures them in a great degree from being undermined, and lessens as much as possible the liability of boats lodging on and being injured by them; and makes the proposed works more assimilated in character with the levees used on large rivers than to the wing-dams with which they are now compared.

It is not supposed that the works contemplated will partake of such permanency of character as to last ages without repair; like the banks of a canal, they will doubtless be subject to breaches, and require attention and labor for their preservation. The practice and experience of the world warrant the inference that a fair title for durability may be claimed for them; and situated as they will be on the alluvial bed of the river brought there by the waters in their natural current, the inference is equally clear that, when additional velocity is communicated to

it, by reducing its width, the light materials of the bars will readily be removed, and channels formed of as great depth as the navigation of the river will require.

The plan of increasing the depth of water on the sand-bars contemplates, also, dams across the cut-offs, so that the whole volume of the river may be confined to its natural bed. The cause of the bar near the head of the New Harmony cut-off is occasioned by the diversion of the waters of the Wabash into the large bayou called Fox river, and the water which is discharged through the New Harmony cut-off. It is intended to dam the Fox river at its head—the New Harmony cut-off on the rock bottom near the mill, and thus restore the current to its ancient channel.

The cut-offs straighten the direction of the river, but, on that account, do not render any advantage to the navigation in low stages. The part of the river the most crooked is between Coffee island and New Harmony, and there the river has the greatest depth.

The descent of the river is about eight inches per mile, taken in its whole extent; and 90 miles in length. The cut-offs and bayous through which the water flows in floods is not one-half of that distance. If the river was confined to these, its velocity would be so much increased that the channel would have to be very narrow to afford water for the navigation of boats. It is not sound policy to use the bayous and cut-offs for that purpose; they cannot give any advantages in dry seasons, and are objectionable on account of the river being the boundary, for about 200 miles of its course, between Illinois and Indiana. The borders of the river are filling with a population with great rapidity, and towns, trade, and capital increasing in size, extent, and value. Slight additional aid given in clearing drift and timber from heads of bayous and deep bends, would be sufficient, in more than one place, to alter the river for miles in extent in both States, and leave towns, where there has been an accumulation of capital, destitute of the navigation which induced its location. Good faith and the comity due adjoining States point to the necessity of early arresting these changes in the bed of the Wabash, to preserve the equality of the benefits between respective places, and the good feeling of their citizens.

The plan of improving the rock bars alone and clearing out the snags would be of immense advantage to the country bordering the Wabash; and with the two feet water which it would afford in seasons when the stage of the river would be as low as in 1838, which would not often occur, flat-boats could descend at all times, and steamboats of light draught, except impeded by ice, could navigate the river at all periods of the year. It is free from the objections of want of permanency, and hazard of being rendered comparatively useless, by changes and new formations of the river. It would connect *equally navigable portions of the Wabash*, and can be constructed for an inconsiderable sum, compared with the benefits it would secure to the citizens of the two States.

The plan of making the improvement for three feet water to the foot of the Grand rapids recommends itself as affording a navigation at all times equal to the exigencies of the country; has the advantage of arresting the further progress of the bayous which may hereafter become subjects of irritability between the two States, and of rendering the naviga-

tion quite as good as the present state of the navigation of the Ohio; and, from the benefits which it would secure to their citizens, would form a subject worthy of the enterprize and co-operation of Illinois and Indiana.

The greatest depth of water which can be obtained, at any reasonable cost, by improving the channel of the Wabash, is three feet. This was not supposed sufficient to answer the requisitions of the instructions received, nor such as would comply with the statute of the State of Indiana authorizing the survey, and the intimation given in it for the examination of the canal route located by P. Von Smith, Esq., at the instance of the citizens of Posey county. So soon as the examinations of the river were completed, the survey of the canal route was commenced.

Until the report of Mr. Von Smith came to hand, which was at a late period in the river surveys, it was supposed that the Wabash at New Harmony, with the aid of a deep cut, would command the summit between that place and Mount Vernon, on the Ohio river. This was not the case, the Wabash lying too low for that purpose.

The point on the Wabash, indicated by the levels for a feeder to supply this canal, is at Coffee island, six miles below the Grand rapids. Big creek was gauged and found to discharge less than 300 cubic feet per minute. Indian creek and Rush creek, if not entirely dry, could only be said to run, and were useless as feeders. No situation well calculated for a reservoir on Big creek was perceived; which, with the doubts of the propriety of relying on such mode to supply so large a canal, (19 miles long, with lockage both sides of the summit,) and the consideration that much of the benefits accruing from the work would be from the water-power it would create, determined the necessity of obtaining the supply from the Wabash.

This route of canal divides itself, naturally, into three divisions. The first or northern division embraces the deep excavation occasioned by sinking a feeder five feet below the surface of the Wabash in a low stage, and extends from the head of Coffee island to Black river, 18 miles.

The middle division, from Black river to Chainville, in common cutting, 12 miles.

The southern division, from Chainville to Big creek, Indian creek, the summit, and to Mount Vernon, 11 miles.

In one respect, Coffee island is an unfavorable point for a feeder or the junction of a canal with the river. The high land of the level country, for over 10 or 12 miles above the mouth of White river, does not approach its southwestern bank, or the bank of the Wabash, until it arrives near New Harmony, and forms a plain embracing the mouths of the White and Patoka rivers, more than 30 miles long and from five to seven broad, which is ordinarily overflowed from 7 to 10 feet deep. It is more than five miles wide at Coffee island, and the nearest direction to the high land is almost at right angles with the course of the canal.

The lower part of this plain is drained by the Big bayou, which leaves the Wabash about six miles below Coffee island, and running a southerly course ten and half miles, is discharged into the Wabash one and half miles above Black river.

The waters of this immense plain are too accumulated in quantity to

be taken into a canal or passed under it, and it is objectionable to have it flow for miles between the canal and the high plain at the base of which, after leaving the Wabash, the canal must be located.

A bayou discharging itself into the Wabash a short distance below the head of the canal, carries off the waters on the subsidence of the floods from the low grounds between the high lands bordering the valley and the bank of the river. A ditch 29 chains long will be necessary to turn its channel into the Wabash above the canal. Further explorations may make it necessary to extend ditches from this bayou to drain the waters intercepted on the low plain by the bank of the canal; but, if any such necessity exists, the expense of forming the drains, from the surveys which have been made, will be inconsiderable, and no provision is made for them.

The dimensions of the canal which are here estimated are, for the least width at surface of water, 52 feet, width at bottom, 34½ feet, with spaces at all places, once in half a mile, where the banks are not sufficiently apart, of 100 feet wide, for steamboats to pass each other; the banks not less than eight feet high; the slopes on both sides, as well as the canal, of one and three-fourths feet base to one foot perpendicular rise; the tow-path ten feet wide at top, the berm bank six feet; the locks 38 feet wide and 175 feet long in the chambers; water-way of aqueduct, 42 feet wide; and the bridges built with draws, to turn on a pivot with a rack and pinion, to open for the passage of boats.

The first eight miles from the Wabash will be very expensive, and there would be not more than \$44,000 additional cost in changing the plan, by raising the level of the canal six feet by a dam across the Wabash, at the lower end of Coffee island, nine feet high—the dam provided with a lock for the passage of steamboats in the Wabash; and the lock of six feet lift added to the canal.

More perfect surveys and examinations may find this the least expensive mode; and from the fact of its forming the best improvement for the Coffee island rapids and the rapids at White river, it presents a strong reason for the construction of the canal as well as the change of plan.

In making the comparison, the dam and steamboat lock on the river, and the six feet lock on the canal, were estimated at \$305,000.

It is not contemplated that the proposed canal will command the steamboat trade except at times of low water. Its want of width and the necessity of using horses to tow the vessels will give the preference to the river when it can be used. The nature of the trade will hardly permit steamboat owners to have relays of horses on the line of the canal; these must be hired, which will increase, in some measure, the hazards of delay.

A steamboat canal on the margin of the Wabash should be six feet deep and 100 feet wide, with the banks paved with stone, so that boats might pass each other at all places, and be propelled by steam. Such a canal, with a dam and lock at Coffee island sufficiently high to raise the water four feet on the rapids at the mouth of White river, would be an effectual improvement of the Wabash from the Ohio to some 15 or 20 miles above the Grand rapids. Its cost, however, places such a work out of the question. It could not be constructed for less than three and a half millions of dollars.

The plan of the work proposed, although not perfect as regards the navigation of steamboats, is well calculated for the trade of the country. Its size will render the freights cheaper than they could otherwise be on a canal of less dimensions, and it also combines the advantage of affording a tolerable mode for the business of steamboats at all seasons of the year when free from ice.

The distance between Mount Vernon and the mouth of the Ohio, by the map, is 19 miles, and the distance in the length of the voyage from that point to the Grand Rapids will be shortened more than one-half by the canal. How far this circumstance, combined with its safety, will compensate for the difference between using it and the river, is difficult to determine, although it is clear it must have some influence on the business and the tolls which will be received.

After leaving the Wabash the canal will be carried near its bank for six and a half miles in a southerly direction, where it meets the Big bayou, which for ten and a half miles in the same course, by being slightly excavated and straightened, will save half the cost of a canal in the common level of the plain. From the bayou it passes near the Wabash, one and a half miles to Black river, which in floods swells to a large stream. It lies too high to be crossed with a dam, and not sufficiently so for a wooden trunk aqueduct to be safe from floods. The canal is carried over this stream on a culvert of ten semi-circular arches of twenty feet span to give it sufficient water way. The cost of this structure is estimated at \$58,000. It is in the back-water, and no apprehensions from drift are entertained.

From Black river to New Harmony, a distance of three and a fourth miles, is a very uniform plain; passing it the canal will be carried along the foot of the bluff bank on the left side of the cut-offs, for nearly one mile; thence generally near the river to Chainville, the end of the middle division.

From Chainville the canal begins to diverge from the valley of the Wabash by turning in a more easterly direction up the plain of Big creek. After some progress had been made in the surveys, the surface of this creek was found to be too low to admit of being crossed in a dam of 28½ feet in height without flooding more country than was considered prudent or safe for the work.

The level of the canal is so little elevated above the range of the floods that a stone aqueduct is here necessary. The aqueduct has three elliptic arches of 50 feet span and 17 feet high. The highest floods will rise over the top of the arch against the aqueduct; but from the extent of the water-way, the small descent of the stream, and its situation in the back-water of the Wabash, it is supposed safe from drifts. The cost of this structure will be \$86,000.

From the aqueduct to the foot of the ridge dividing the waters between the Wabash and the Ohio, the canal is taken two miles on the southwestern banks of Big and Indian creeks. In ascending the ridge the ascent is 12 feet in one mile; in the second mile, it raises from 12 to 21 feet; the third mile, from 21 to 33; the next half mile rises to 38 feet and descends to 33; the next mile of the summit descends to fifteen feet, which is the height of the plain one mile from the locks on the bank of the Ohio river. The lockage is overcome by four locks, the three first next the Ohio of 14 feet lift, and the fourth of 15 feet lift.

The cost of the northern division,	18 miles 28 chains,	is	\$932,250	16
of the middle division,	12 miles 27 chains		221,806	37
of the southern division,	11 miles 15 chains		1,065,051	22
			<hr/>	
			41	70
			<hr/>	
			\$2,219,107	75
			<hr/>	

The route and plan are not favorable for cheap construction. In taking a feeder from a large stream with small descent, much cost is unavoidably encountered. To this, in the present instance, are to be added the large size of the locks, the necessity for draw-bridges, the cost of a stone aqueduct over Big creek, the expensive culverts over Black river, and a guard-lock 33 feet in height, estimated to cost \$123,000, at the head of the canal, which, with the deep excavation at the Wabash feeder and the deep cut near the Ohio, swells the costs much beyond the price per mile for which canals have been generally made.

It is proper to remark that the estimates for the northern and middle divisions were made from the notes and levels taken in the river surveys, and on a revision would be susceptible of improvement; which, to some extent, would reduce the cost of the work and shorten the route. This remark is particularly applicable to the middle division. The southern division was carefully surveyed to determine the point of a feeder from the Wabash; and as the line down the river was carried along the plain on which the upper part of the line must be located, (that fact being determined by the course of the bayou,) a re-survey for all practicable purposes was unnecessary; and to compensate for the difference of costs, which may be saved by a strict examination, no allowance has been charged for contingencies and superintendence, which will amount to a sum which will at least equal all the benefits derived from the final location.

The greatest portion of the expenses of the canal is at its terminations. The first eight miles, next the Wabash, are estimated to cost \$731,933 48, and the first four miles next the Ohio, \$795,037 28.

The locks and aqueducts are estimated to be built of hewn stone, laid in hydraulic cement.

The plan and estimates provide for a moderate sized basin for steam-boats at Mount Vernon, and a basin for mills and water privileges.

In the receipt of tolls, and the rents derived from the sales of the water-power, the canal would have an advantage over the improvements contemplated in the channel of the Wabash. The country through which the canal route passes, in the greatest part of its length, is well cultivated, rich in agricultural productions, abounds in timber, and is supplied with iron ore, limestone, and marble. It is nearly destitute of water-power; consequently, its introduction would be of immense value.

There are now in operation in Posey county 12 steam engines, which are said to cost their owners the average sum of \$2,000 each, or the gross sum of \$24,000 annually, for keeping them in fuel. The construction of the canal would create water-power to an extent which would only be limited by the demand. It could be used from Black river to Big creek, as well as at the site at Mount Vernon, where it would have a fall, in ordinary stages of the Ohio, of more than forty feet.

The extent of the manufactures, now in Posey county, warrants the belief that its citizens would, soon after the water privileges were offered for sale, become purchasers to the amount they now expend for fuel on their mills; and the facilities for procuring raw materials, with the command of markets on or near the Ohio, would so induce the establishments of emigrants for manufacturing flour, lumber, and iron, that five years would not elapse before the rents for water privileges would be worth \$30,000 annually; which, with the tolls received, although they will not be so large in amount as if the canal was more remote from the Wabash and the canal now being constructed between Evansville and Terre Haute, yet would go far towards reimbursing, or perhaps, in time, completely paying its cost of construction.

The extreme sickness of the season greatly retarded the surveys, increased its expense, prevented, in some measure, that close examination which, under other circumstances, would have been given; and, from the ill health consequent on its exposure, have unavoidably delayed this communication until the present moment.

The disbursements made previous to the 1st of December, were—

On contracts with Messrs. Wilson, & Co.	-	-	-	\$6,409 00
For surveys and superintendence	-	-	-	4,192 31
				<u>10,601 31</u>

Of this sum—

The Commissioners on the part of Indiana paid:

For construction account	-	-	\$1,093 00
surveys and superintendence	-	-	1,056 83
			<u>5,149 83</u>

The Commissioners on the part of Illinois paid:

For construction	-	-	2,316 00
surveys and superintendence	-	-	3,135 48
			<u>5,451 48</u>
			<u><u>10,601 31</u></u>

As per account with vouchers rendered.

Appended are abstract of contract prices, specifications, and notice exhibited at the letting, and blank form of contracts.

All of which is respectfully submitted.

D. BURR,
Principal Engineer, Wabash river.

*Abstract of contract prices for the lock and dam at the Grand Rapids of the
Wabash river.*

Lock Section No. 1.		Dam Section No. 2.	
William Mudge, contractor.		Baker, Riley & Co., contractors.	
Items.			
	<i>prices.</i>		<i>prices.</i>
For regular coursed masonry in lock and abutment walls, per cubic yard, if the materials be procured from the quarry at Portersville - - - -	\$14 00	-	\$14 00
If from the quarry near Gater's - - - -	16 00	-	14 00
If from the quarry near Petersburg - - - -	11 50	-	13 00
For earth excavation, in lock-pit above water, per cubic yard - - - -	18		
For earth excavation in abutment-pit above water, per cubic yard - - - -		-	13
For earth excavation in lock-pit below water, per cubic yard - - - -	50		
For earth excavation in abutment-pit below water, per cubic yard - - - -		-	50
For rock excavation in lock-pit below water, per cubic yard - - - -	1 00		
For rock excavation below water and below lock pit, per cubic yard - - - -	1 50		
For stone filling in crib protection, above and below lock, per cubic yard - - - -	1 50		
For stone filling in dam, per cubic yard - - - -		-	1 10
For stone pavement or rip-rap protection below lock cribs, per cubic yard - - - -	1 50		
For stone rip-rap protection below abutments, per cubic yard - - - -		-	1 10
For square timber in crib protection wall, per lineal foot - - - - -	14		
For square timber in lock foundation, per cubic foot - - - - -	14		
For timber in cribs of dam, per cubic foot - - - - -		-	14
For timber in abutment foundation, per cubic foot - - - - -		-	14
For timber in culvert foundations, per cubic foot - - - - -	13	-	14
For square timber in culverts, per cubic ft.	13	-	15
For round ties, per lineal foot - - - -	10	-	10
For puddle, per cubic yard - - - -	40	-	35
For sheet-piling, per square foot - - - -	10	-	8
For 6 inch covering timber for dam, per superficial foot - - - - -		-	12½

ABSTRACT—Continued.

Lock Section No. 1.		Dam Section No. 2.	
William Mudge, contractor.		Baker, Riley & Co., contractors.	
Items.	prices.		prices.
For wrought-iron in straps, clamps, screws, rods, chains, gate-irons, and all other wrought-iron about the dam, lock, or culverts, except the spikes, per pound	\$0 20	-	18
For cast-iron, including capstan wheels, shafts, and all other cast-iron, per lb.	15	-	
For square timber in gates and mitre sills, per cubic foot	12	-	
For wood-work in lock-gates and mitre-sills, including framing, planking, fitting paddle gates, and all the wood-work represented in the drawings or described in the specifications, and hanging the gates complete, for the gross sum of	600 00	-	
For 3 inch plank on lock, culvert, or abutment foundations, per square foot	10	-	5½
For 2 inch plank in lock, culvert, or abutment foundations, or for facing walls of cribs, per square foot	8	-	4
For wrought-iron spikes in dam, crib protection, lock-gates, chamber of culvert, per lb.	20	-	18
For gravel above dam, per cubic yard	-	-	35
For gravel in culvert cribs	40	-	35
For earth excavation in culvert-pit	16	-	15
For earth excavation in side-cut canal, per cubic yard	16	-	15
For embankment for guard-bank	14	-	16
For clearing and grubbing under guard-bank, per lineal chain	6 00	-	5 00

Article of Agreement

Entered into this day of one thousand eight hundred
 hundred by and between M. K. Alexander, Commissioner of the
 State of Illinois, and acting in its behalf, and Thomas H. Blake, Com-
 missioner of the State of Indiana, and acting in behalf thereof, party of
 the first part; and
 party of the second part

Witnesseth, that the said party of the second part, for and in consid-
 eration of the payments, and covenants hereinafter mentioned, to be
 made, the said party of the second part do hereby agree, covenant, and
 engage to furnish all the materials, and perform all the labor, necessary
 to build and construct section No. of the joint improvements
 of the States of Indiana and Illinois, of the Wabash river at the
 embracing the together with the abutments, guard-
 banks, canals, crib protection-walls, pavements, and all the fixtures re-
 presented in the drawings or described in the specifications exhibited at
 the letting of said section; which drawings and specifications are deemed
 and taken as part of this contract; and further agree to build and con-
 struct all the walls, embankments, crib-work or other fixtures, which
 may be directed by the engineer having charge of the work.

In consideration of the work so to be done and executed, it is agreed
 and understood, that there shall be paid by the Commissioners aforesaid
 to the said party of the second part, as follows:

- For regular coursed masonry in lock-walls, per cubic yard,
- If the materials be procured from the quarry at Portersville,
- If from the quarry near Gaiter's,
- If from the quarry near Petersburg,
- For earth excavation in abutment pit above water, per cubic yard,
- For earth excavation in lock-pit below water, per cubic yard,
- For earth excavation in abutment pit below water, per cubic yard,
- For rock excavation in lock-pit below water, per cubic yard,
- For rock excavation below water, and below lock-pit, per cubic yard,
- For stone filling in crib protection, above and below lock, per cubic
 yard,
- For stone filling in dam, per cubic yard,
- For stone pavement, or rip-rap protection, below lock-cribs, per cu-
 bic yard,
- For stone rip-rap protection below abutment, per cubic yard,
- For square timber in crib protection-walls, per lineal foot,
- For square timber in lock foundation, per cubic foot,
- For timber in cribs of dam, per cubic foot,
- For timber in abutment foundation,
- For timber in culvert foundation,
- For square timber in culvert, per cubic foot,
- For round tiers, per lineal foot,
- For paddle, per cubic foot,
- For sheet piling, per square foot,
- For 6 inch covering timbers for dam, per superficial foot,
- For wrought iron in straps, clamps, screws, rods, chains, gate irons,
 and all other wrought iron about the dam, lock, or culverts, except the
 spikes, per lb.

For cast iron, including capstan wheels, shafts, and all other cast iron, per lb.

For square timber in gate and mitre-sills, per square cubic foot,

For wood work of lock gates and mitre-sills, including framing, planking, fitting paddle-gates, and all the wood work represented in the drawing, or described in the specifications, and hanging the gates complete, for the gross sum of,

For 3 inch plank in lock, culvert, or abutment foundations, per square foot,

For 2 inch plank in lock, culvert, or abutment foundations, or for facing walls of cribs, per square foot,

For wrought iron spikes in dam, crib-protection, lock-gates, chamber of culvert, per lb.

For gravel above dam, per cubic yard,

For gravel in culvert cribs,

For earth excavation in culvert pit, per cubic yard,

For earth excavation in side-cut canals, per cubic yard,

For embankment for guard-bank, per cubic yard,

For clearing and grubbing under guard-bank, per lineal chain,

It is understood that the prices offered for the above items are intended to include materials and labor of every description required to fit and put them in the work. The plank, timber, and all other materials paid for by measurement or weight, shall be estimated, or the quantities shall be determined, by the dimensions of the timbers, or other item, as it lies in the work when finished.

No allowance will be made for bailing water, and no extra allowance will be made in any case for the performance of this contract, beyond the sum stipulated herein, except for additional or extra work.

It is further agreed that any items of work that may necessarily occur in or about the lock and dam, not already specified in this contract, or represented in the plan, or described in the specifications, and which may be directed to be done by the engineer, shall be estimated by him and paid for according to its value.

And it is further agreed that this contract or any part thereof shall not be transferred, or sub-contracted in any manner, or under any pretence whatsoever, except for the procuring of materials.

And the party of the second part further agree that, whenever required by the Commissioners aforesaid, or the engineer having charge of the works, _____ will engage and employ a first rate mechanic to superintend the construction of the structures included in this contract, whose qualifications shall be approved of by the Commissioners or engineer aforesaid; and the party of the second part further covenant and agree to dismiss from _____ service and employment, such mechanic or any disorderly quarrelsome person, who shall wantonly commit any trespass, either upon the person or property of any individual whatever, or be guilty of any offensive conduct of any kind: and at any time, the party of the second part covenant and agree to discharge from _____ service, all and every person or persons employed by or under _____ whenever thereto directed by the engineer having charge of the works.

And it is further understood and agreed that the party of the second part shall commence said section No. _____ including the _____ and other works, on or before the _____ 1838; and it is further agreed that the said party of the second part shall and will, in all and every thing and matter, conform to the orders and directions of the chief engineer, or assistant engineer, or other person having charge of the work, and do and execute all the work in the said contract mentioned in the mode and manner directed by them; and whenever the said engineer may and shall think proper to change, alter, enlarge, diminish, or alter the amount of work or location of the work on this contract, he shall have full power and authority to do so; and the said party of the second part do bind _____ faithfully to observe and obey his instructions and directions touching such change, alteration, enlargement or lessening; and when the same is done, the said engineer shall have full power to make such addition to or deduction from the amount agreed to be paid for the work as, in his opinion, may be just and equitable.

It is further understood and agreed by the parties that, in case the said section No. _____ embracing the _____ shall not be commenced within the time above stated; or if at any subsequent period, the party of the second part should, in the opinion of the engineer having charge of the work, fail, refuse, or neglect to prosecute this contract with a force proportionate to the quantity of the work to be done, and the period in which it is to be completed, or shall sub-contract or relet said section No. _____ or any part thereof; or shall not give personal superintendence to the work, or shall refuse at any time to conform to the directions of the principal engineer, or assistant engineer, or superintendent of the works, or shall violate, in any way or manner, any of the stipulations, provisions, or conditions of this contract, the Commissioners shall have power to declare this contract forfeited, and null and void; and, on their declaration, the same shall cease and determine forever, and as if it had never been made, and they may proceed to relet the same; and in case of such declaration or forfeiture, the retained per centage, hereinafter provided for, shall belong to the States of Indiana and Illinois, as a compensation for damages which, it is hereby agreed by the parties, they shall be entitled to in consequence of a failure of the party of the second part to perform the stipulations of this contract.

It is understood, and mutually agreed, that, if in the opinion of the principal engineer at any time the party of the second part shall fail to give reasonable assurance of finishing the contract in the time specified for its completion, the said engineer, with the consent of the Commissioners aforesaid, shall have full power to authorize an agent to employ hands, purchase materials, and complete the work; the expense of which shall be charged to the party of the second part, and be deducted out of the amount which would be due under the terms of this contract; and in the final settlement of accounts, the receipts of such disbursements made by such agent shall be taken and considered as good off-sets to the amount due to the party of the second part.

It is mutually understood and agreed that the amount of work done, and the materials delivered at the site of the works, at contract prices,

and the value for the stone quarried and delivered near the quarries, shall be estimated by the principal engineer as nearly once in each month as can be conveniently done; and that, for eighty-five per cent. of such estimate, the party of the first part will give, within ten days after, their checks to the party of the second part on the Branch Banks, either at Mount Carmel or at Vincennes, payable at sight; and that when this section No. _____ shall be completed and finished according to

the contract, plans, specifications and directions of the engineer, or within thirty days thereafter, the amount and value of all the works and materials shall be valued by the engineer in charge of the works; and on the presentation of his certificate, or within ten days thereafter, the balance due the party of the second part, including the amounts of the fifteen per centages retained from time to time, shall be paid to the party of the second part.

And it is further understood and agreed that the decision of the principal engineer shall be final and conclusive, as to the manner of the work and the quality of the materials to be used in the structures embraced in this section, and conclusive in all disputes, matters and things relating to this contract; and each and every of the said parties do hereby waive any right of action, suit or suits, or other remedy in law, or otherwise, by virtue of said covenants, so that the decision of the said principal engineer shall in the nature of an award be final and conclusive on the rights of the parties.

The party of the second part covenant and agree to finish, complete, and deliver up this contract on or before the _____ day of _____

In witness whereof, the parties have hereunto set their hands and seals, this day and year first above written.

Specifications of the works at the Grand Rapids of the Wabash river.

The chamber of the lock will be 175 feet long, from quoin to quoin, and 38 feet wide. The whole length of the lock, including the chamber, will be 236 feet; the river wall will have a base of 16 feet, and the wall on the shore side of the lock a base of 14 feet in width.

The lock-pit, if the rock of the river bed should not prove sufficiently solid to form parts of the walls, will be excavated 244 feet long in the bottom and 76 feet wide, except along the middle of the chamber, on a distance of about 100 feet, where it may be reduced to 72 feet wide. The bottom of the pit will be excavated to such depth, and the slopes of the sides and the ends of the pits shall have such inclination as the engineer may direct. The parts of the bottom of the pit on which masonry is to be built will be required to be dressed down to an even, solid, horizontal surface; and where the rock proves to be sufficiently compact and firm to be used for a portion of the walls, it will be required to be cut off in benches, smooth and without being shattered, to correspond in height and width with the courses of masonry. And in the same manner where the rock is fitted to receive timbers, a solid, even bed must be prepared for the same to rest on or lie against, where the

sides or ends come in contact. In case rock should occur in the abutment-pit, the same regulations will be observed.

The rock in the bed of the river below the lock-pit, between the protection walls, will be excavated to such width and depth as may be found necessary for the admission of boats and vessels into the lock; the quantity and dimensions of which excavations will be determined by the engineer.

The foundation timbers which form the bottom of the lock are to be hewn square, laid side by side, 14 inches deep and not less than 12 inches wide, and long enough to extend $2\frac{1}{2}$ feet under each wall; a hole, 2 inches in diameter and 20 deep, is to be drilled near the centre line of the lock under the middle of each timber, and a seasoned locust or white-oak pin, 2 inches in diameter, pierced through the middle in the direction of its length, with a half-inch hole; it is to be driven firmly into the hole in the rock. Each timber as it shall be laid will be secured by a 7-8 inch bolt, driven through it into the hole in the rock below. The bolts to be ragged at the ends. The timbers are to be covered with 3 inch white-oak plank, laid lengthwise of the lock, and secured with 14 inch seasoned white-oak or locust pins, 10 inches long, and put in in the proportion of two to every third timber in each plank. Both the timbers and the planks are to be fitted closely to the rock, and the joints between the ends of the planks and the joints between the timbers and the rock are to be made water-tight.

The walls of the lock will have the form and dimensions represented in the plan; they will be vertical on the faces towards the chamber, from the head of the lock to the upper hollow quoin, and from the upper end of the lower recess to the lower end of the wall. The face of the wall between the upper hollow quoin and the upper of the lower recess will have a curve at the top of 2 inches—the line of the wall at the bottom will be straight; the outer face of the wall on the river side will have an inclination or batter of $1\frac{1}{2}$ inches to each foot in length; the back of the lock on the land side of the lock will have an inclination, to be made in offsets of $2\frac{1}{2}$ inches to each foot in height.

The walls are to be regular coursed masonry throughout; the smallest courses are not to be less than 14 inches thick or deep, and they may vary from 14 to 30 inches; the stones which form the inner faces of the walls are to be cut smooth on the face, and the beds and joints are to be dressed even, and so as to form right angles with the face, except the beds of the lower course on each side, which are to be bevelled in such manner as to give the curved part of the wall the desired inclination; the stretchers are to have beds and joints of not less than $2\frac{1}{2}$ feet in width, measured from the face back into the interior of the wall.

The headers, in all the courses from 14 to 24 inches thick or deep, are to be two feet wide from joint to joint measured horizontally on the face; and in courses of more than 2 feet in thickness, the headers on the face of the wall to be cut square, with the same bed as thickness, the beds of the headers to be dressed evenly throughout, and the joints are to be dressed as far back as the joints of the stretchers will extend; each header shall extend back into the wall of the full size of at least $4\frac{1}{2}$ feet in the smallest courses, and 5 feet in the courses which are more than 16 inches deep on the face; the headers in each course are to be placed at intervals of not more than 10 feet, measuring from centre to centre; the

space between them shall be filled with either one or two stretchers. The headers and stretchers in the outer face of the river wall are to be of the same dimensions as those on the inner face, but the faces of those on the outer side are to be bevelled so as to give the wall the inclination or batter above mentioned. A draught is to be cut around the face of each stone, and the middle part may be dressed off with the pick and bush-hammer; the headers in the back of the wall, on the land side of the lock, are to be of the same dimensions as those in the face; and in all places in the walls where the headers will not lap or pass each other in the centre, a third course of headers are to be laid, of a suitable length in the interior of the wall, in such manner that they will reach or extend one foot or more beyond the headers from the sides of the wall. The backing is to be made up of stones of the same thickness or depth as the face stones, both beds are to be dressed so as to give even and parallel surfaces. The sides of the backing stones are to be dressed with the hammer, and generally to contain not less than 10 cubic feet, and are to be so arranged as to break joints, in order to bind the wall strongly together, and give the whole width of the structure a firm bond. The mortar joints in the face of the walls are not to exceed $\frac{3}{16}$ of an inch in thickness.

When one course shall be laid throughout its whole extent, it must be well grouted, and the whole of the upper bed dressed off to an even horizontal surface, before the commencement of another course. The thickest courses are to be laid in the bottom of the wall, and the thinner courses towards the top, unless otherwise directed by the engineer.

In each superior course, the headers are to be placed midway between the headers in the course below, and the backing stones in it are to be so arranged as to break joints with the backing stones and headers in the course below.

The breast of the lock will be raised to such height as will hereafter be determined by the engineer, and will be covered with oak timbers of the same dimensions, and with 3 inch plank in the same manner, and the timbers to be extended into the walls the same distance as the timbers and plank are laid in the parts of the chamber of the lock; a double course of sheet piling is to be put in across the upper end of the lock and the upper ends of the pile plank and are to be so fitted as to make a water-tight joint with the plank which covers the breast. Under the mitre sills the wall is to be formed of large stone, with beds and joints, cut and fitted in such manner as the engineer may direct. The faced stones under the mitre sills are to have vertical joints at right angles to the curve of the breast; holes are to be drilled in the wall to receive iron rods to secure the mitre sills.

The mitre sills will be made of the form and dimensions represented in the plans; they will be put in after the lock walls are built, and secured to the foundation timbers with eighteen 1 inch square bolts, 30 inches long, put in at such points as the engineer may direct. The timber will be of the best white-oak, hewn smooth and planed, and the joints fitted in the best manner.

The upper mitre sills will have, in addition to the common bolts, bolts of $\frac{1}{4}$ inch iron, to pass through the timbers into the wall below; there will be four of these long bolts in each upper mitre sill.

The coping, hollow quoins, and breast stones are to be of such com-

compact strong stone as shall be approved by the engineer; the coping stones are to be of the dimensions represented in the plans; they are to be in all cases not less than 18 inches thick. The quoin and breast stones are to be of such form as the engineer may direct; they are to contain each not less than 25 cubic feet.

The mortar used in the walls is to be made of hydraulic lime and clean sand mixed in such proportions and made in such manner as the engineer may direct. The stones are all to be laid in thick mortar, extending 18 inches back from the front, the wall being first wet before it receives the mortar; the stone to be laid will then be wet, brought to its position, and settled with a heavy maul, until its surface bears firmly on the stone beneath, crushing out all surplus mortar, and leaving only so much as will fill the cavities; the face of the stone will be brought to its vertical position by sinking and not raising the back part; the ends of the stone will be placed closely in contact without mortar, and the joint will afterwards be filled by crowding the mortar forward from the back of the stone, by means of a thin iron blade made for that purpose; thin mortar or grout is to be used for filling up the joints and cavities after each course shall be laid. All the grout used shall first be made into thick mortar well mixed, and afterwards reduced to the proper consistency by the addition of water.

The capstan wells are to be placed in the walls as represented in the plan; from the bottom of the coping to the bottom of the well, they are to be 18 inches square; the part through the coping is to be enlarged to receive the cast iron frame of the wheel and pinion; a plate of cast iron, with a socket to receive the end of the capstan shaft, is to be built in the bottom of each well; when the lock wall is laid, the plate is to be laid upon a stone of large size, and secured to it by bolts. Holes, 1½ inch in diameter and 6 inches deep, are to be drilled into the stone, and filled up with a seasoned white-oak or locust plug; the spikes are to be driven into these plugs; the opening from the bottom of the well to the face of the wall is to be 18 inches wide and 18 inches high at the end next to the well; the bottom of this opening will have a descent from the well outward, of 2 inches in each foot; the lap will be horizontal; a bar of iron, 4 inches wide and 1 inch thick, will be laid in the wall on a level with the bottom of the capstan drum, and 1 foot back from the face of the lock wall; this bar of iron will extend 1 foot at each end into the wall, and will be let into the lower stone, so that the upper surface of the bar may be level with the surface of the stone.

The shaft, drum, wheel, and pinion, to be placed in each capstan well, are to be of cast-iron; the gudgeons and journals are all to be turned and well fitted to the boxes.

There will be 3 chains to each gate, 1 to open it, 1 to shut it, and 1 about 6 feet long, to secure it to its place when opened during a freshet. The chains will be made of ½ inch round iron, with short links partially twisted; the chains for drawing open the gates will be fastened to the mitre post by a staple bolt inserted near the surface of the water; the chains for closing the gates will be attached near the bottom of the lock, at the lower gates, and near the top of the mitre sills, at the upper gates; these chains will be attached to the mitre post by a ½ inch iron

rod passing through the eye bolts, and fastened at the top by a key; the chains will be fastened to the drums by a staple bolt.

The frames of the lock gates are to be made of the best quality of white-oak timber, seasoned at least one year. The gate bars are to be framed into the mitre and quoin posts by double tenons on each end. The joints are to be strengthened by plates of iron (T's and L's) let into each face of the timber, and secured by $\frac{3}{4}$ inch screw bolts; a band of iron is to be put upon the top and bottom of each quoin and mitre post; the bands are to be driven on to the ends of the posts, and secured by driving wedges into the ends of the timber.

There will be 5 cast iron paddle gates, each 30 inches square, in each lock gate; they will be placed between the lower bar in the manner represented in the plan, with the rods and irons in which they are worked and secured. A cast iron box, with a socket, is let into the quoin post, and fastened with wedges; a pedestal, with a pivot to fit into this socket, is to be placed upon the lower course of plank, and secured by bolts; this pivot and socket will form the hinge for the bottom of the gate; the upper end of the quoin post will be supported by an iron collar, secured by anchor bolts, as represented in the plans.

The roller-way will be formed of a piece of white-oak timber, 14 inches wide and 8 inches thick, cut so as to form the proper curve, to be spiked to the lower course of plank in the bottom of the lock for a roller-way for each gate; the upper corners of this timber to be bevelled off, and a bar of iron, 4 inches wide and 1 inch thick, is to be fastened on the centre of the timber; the spikes with which the iron is fastened will be counter sunk, so that the surface of the way may be smooth; the roller and the pillow block, for securing it to the bottom gate bar, will be made of cast iron; the pillow block let into the bottom bar, and fastened by screw bolts; the axle of the roller will be made of wrought iron, and the gudgeons turned in the roller, and will be secured to the pillow block with staple bolts, as represented in the drawings.

Cramp irons for securing the coping of the lock will be formed by a line of iron bars, 2 inches wide and $\frac{1}{2}$ inch thick, let into the stone, on a line 18 inches back from the face of the wall; holes 6 inches deep, 1 $\frac{1}{2}$ inches diameter, are to be drilled into the coping under the line of bars at intervals of 18 inches or less; when the joints render it necessary a seasoned white-oak or locust pin, with a small hole lengthwise through the centre, is to be driven into each hole; holes are made in the bars to correspond with the holes drilled into the coping, and an iron spike, $\frac{3}{8}$ of an inch in diameter and 5 inches long, is to be driven through each hole in the bar into the locust pin in the coping; a spike will be put in the end of each bar; the bars are to be regulated so as to make joints in the middle of each coping stone.

At the recesses for the gates, the line of bars are to pass each other, or lap 2 $\frac{1}{2}$ feet; a line of cramp bars are to be put along the outer face of both walls in the same manner as they are put on along the inner faces.

A second course of bottom plank will be put on after the walls are built and the mitre sills and roller-ways put down; the planks for this course will be seasoned white-oak, 2 inches thick, jointed on the edges and ends; and, when laid, are to be so fitted to the walls, mitre sills, roller-

ways, &c., as to make water tight joints; the planks will be laid lengthwise of the lock, and they are to be secured with hammered iron spikes, half an inch square and 12 inches long, put, in the proportion of 2 spikes to every third timber, in each plank; the spikes are to be driven so as to pass into the centre of the 14 inch timbers.

The gates are to be planked with 3 inch yellow-pine plank, well seasoned, planed and jointed at the edges; they are to be carefully fitted into the rabbits of the bars and posts, and secured with hammered iron spikes, $\frac{3}{8}$ of an inch square and 7 inches long, put in the proportion of 2 to each timber or bar for each plank; the gates are to be painted with such paint as the engineer may direct; the iron work is all to be covered with the kind of black varnish commonly used for painting iron.

Walls of crib work, filled with stone, will be built above and below the lock walls, to secure a safe channel for boats; the crib work on the river wall will be extended above and below the lock 180 feet, and 90 feet above and below the land wall.

The walls of the crib work will be formed of hewn timber, 12 inches square, one on each side, and one in the centre, connected together by ties of sufficient length to pass through the walls, and placed at intervals of 8 feet, measuring from centre to centre; the sides which form the boat channel will be vertical, and the outer face of the river wall have the same batter as the river side of the lock wall; the width of the crib work at top will be 10 feet, and the ends of the ties will be fitted into the face of the timbers with a dove-tail joint. Each dove-tail joint, and each point where the timbers cross each other, or are boxed on each other in any part of the crib work, will be secured by a seasoned locust or white-oak tree-nail, 2 inches in diameter and 22 inches long, driven its whole length into the timbers below. Above water, the timber to be oak; below, of oak walnut, or cypress.

The cribs are to be filled with rubble sand stone, procured near the site of the works, closely packed in within 2 feet of the top of the crib work; the balance of the top of the cribs is to be filled with flat stones at least 2 feet long or deep, placed edgewise in courses across the wall so as to form a pavement 2 feet deep; the stones are to be closely fitted, and the last course in each crib is to be driven in with a maul or ram. The dam will be constructed of cribs of timber filled with timber as represented in the plans.

The length of the base of the dam will be 50 feet, the slope on the upper side will have a base of 4 feet to each foot in height, and on the lower side of the comb, a slope of $2\frac{2}{3}$ feet base to one foot in height.

After the sand, gravel, and loose stones shall have been removed as far as the engineer may deem necessary for a solid foundation, the timbers in the direction of the stream will be fitted to the rock in the channels which are won by the water, and secured by tree-nails of seasoned white-oak or locust timber, 2 inches in diameter, and let 18 inches into the rock, at the point intersected by the range timbers crossing them in the direction of the comb of the dam; these timbers will be connected with ties of suitable lengths and thickness, secured with tree-nails and iron bolts, if deemed necessary, and filled with stone to a height corresponding with the general level of the rock.

The timbers which lie in the direction of the stream will then be

laid at intervals of 10 feet from centre to centre, with the largest end down the stream, and be connected with the range of timbers to be laid so as to form three equal ranges of cribs; the range timbers are to be laid so as to form three equal ranges of cribs on each side of the comb of the dam as represented in the drawings; they are to be notched on the ties, by cutting away both timbers, so as to give a bearing of at least one superficial foot. The largest timbers are to be placed towards the lower side, and the smaller timbers in the upper side of the dam.

The outer faces of the timbers which form the upper and lower range are to be hewn, and the whole of the upper face of the crib work is to be made smooth, to receive the sheet piling. The range timbers upon which the covering is to be placed are to be hewn upon the sides which the covering will rest. The range timbers, to which the lower covering timbers are to be fastened, are to be secured in their places by closely fitted dove-tail joints, made with the ends of the ties. Each dove-tailed joint, and each point of contact where the timbers cross each other, is to be secured or fastened by well seasoned heart white-oak, or locust tree-nails, 2 inches in diameter and not less than 22 inches long.

The cribs are to be filled with rubble sand stone, procured from the river bed, or sand rock bluff, on the left bank of the river, immediately above the lock. The stones are to be closely packed in the largest stones are to be put into the lower cribs, or those on the lower side of the dam.

A double course of sheet piling is to be placed along the upper end of the dam; the planks are to be arranged so as to break joints, and be so put together as to be water tight; the piling is to extend down to the rock, and the top cut and fitted to make water-tight joints with the covering.

The covering of the slope of the dam is to be made with white-oak timbers, 6 inches thick and not less than 1 foot wide.

The timber is to be sawed or hewn square; the sides are then to be bevelled or cut off, so that when the pieces are laid together, the joints shall be close at the bottom and $\frac{1}{2}$ inch open at the top. The upper covering timbers shall be at least 21 feet long, and the lower covering timbers be of one piece. Each piece of covering of timber shall be secured to the range timbers with spikes, $\frac{3}{4}$ of an inch in diameter and 15 inches long, and put in the proportion of three to each piece of timber, except the pieces which form the weir or comb of the dam, in each of which four spikes are to be used.

The heads of the spikes in the lower slope are to be sunk $1\frac{1}{2}$ inches below the surface of the timber.

The timbers used in building the crib work of the dam are to be not less than 25 feet long, and 15 inches in diameter at the smallest end. All the timbers in the part of the dam above the surface of the water below the lock are to be of white-oak; the timbers below the water may be of oak, walnut, or cypress, or any other strong timber, approved of by the engineer.

The outer wall of the lock forms the abutment of the dam on the east side of the river. If, on opening the pit for the abutment on the opposite end of the dam, the rock should extend into the bank, and prove sufficiently solid for the foundation, the rock will be dressed off

to an even horizontal surface; the walls will then be laid. The courses of masonry in the abutment may vary from 30 to 10 inches in thickness; the thickest courses are to be placed nearest the foundation; but the lower course will not be less than 18 inches thick, nor each stone of the course be less than 2 feet wide and 4 feet long, or it will extend into the wall 4 feet. The headers will be of the same dimensions as those in the lock, and placed in each course of masonry, 9 feet from centre to centre; the spaces between the headers are to be filled up with one or two stretchers, the stretchers to have beds of two feet, and the beds of the headers and stretchers are to be dressed with a hammer or other tool, to give them an even surface throughout; the face of the wall must be dressed or cut, and the joints made to fit closely for 18 inches back into the wall.

The backing stones are to be of large size, of good shape, and generally of the same thickness as those of the face stones of the course, their beds to be dressed evenly with the hammer, and be so laid as to break joints, and give every portion of the wall a fine bond. The coping stones will be secured with cramp irons in the same manner as the lock coping; they will be 18 inches thick, and will not contain less than 25 cubic feet; both beds of each stone will be dressed with a pick, or other tool, to an even surface.

If a solid rock foundation cannot be obtained, timbers will be laid on the porous shelly rock, hewn four square, of oak, walnut, beach or sugar-tree, 12 inches thick, and at least 12 inches wide in the foundation, of such lengths that they will extend through the entire width of the wall, and be laid parallel to each other, one foot apart, the spaces between them to be filled up with puddle, well rammed or pounded between them; and then this timber foundation to be covered with 3 inch plank, jointed closely, and well secured to the timbers by seasoned white-oak tree-nails, in such numbers and places as shall be deemed necessary by the engineer to secure the same.

A double row of sheet piling well tongued and grooved, so arranged as to break joints, will be placed along the upper wing wall from the dam through its whole length, and from thence be continued to the sheet piling of the culvert for water-power.

The culverts for the introduction of water into the canals around the lock and abutment of the dam, for hydraulic purposes, are to be constructed of wood, built on a timber and plank foundation, similar to the one specified for the timber foundation of the abutment.

The culverts will be 80 feet long, and at the ends to form parapets, to sustain the embankments; each side wall will be 16 feet wide, and continued that width 16 feet back towards the centre, so as to form two ranges of cribs, each 8 feet square, at each end of the culverts; the remaining part, or 48 feet of the interior of the side walls, will be 8 feet wide, and be connected by ties, every 8 feet, to the side timbers of the walls with dove-tail joints, so as to form a single row of cribs for that distance, of 8 feet square; between the outside walls, 7 water ways or sluices are to be constructed, $3\frac{1}{2}$ feet wide by 4 feet high, by 5 ranges of timber placed on the plank floor of the foundation, parallel with the side walls; each piece of which timber will be 18 inches wide, and not less than 1 foot thick, counter hewed, and laid perpendicularly over the

other; the outside walls of the cribs are to be vertical, counter-hewn, and the timbers resting on each other with a close joint; the cribs and water-ways are to be carried up $4\frac{1}{2}$ feet; the water-ways are to be covered by a course of heavy timbers counter hewn, 18 inches thick, laid side by side, and boxed on 3 inches to the ranges of timber and side walls which form the water-ways.

The crib work of the parapet or end walls will be extended across the upper part of the covering timbers, and carried up to the height indicated by the plan; the face of the parapet wall, on the upper end of the culvert, will be covered with 2 inch plank 8 inches wide, the edges planed so as to make water-tight joints, and to be fastened to the timbers of the wall with $1\frac{1}{2}$ inch white-oak seasoned tree-nails put in in sufficient numbers as directed by the engineer, to secure the plank facing, and to be driven through the plank 6 inches into the timbers they rest against.

The plank covering will extend over the ends of the ranges of timber which form the water-ways, except the timbers of the top and bottom courses, which will extend 1 foot beyond the line of the wall, to be framed into posts, which will form the bent of the frame work, at the head of the culvert, for the insertion of 4 sliding and 3 cast iron paddle gates, for the introduction of the water into the canal.

The sliding gates will be made 3 feet 9 inches wide, and four feet 9 inches long, out of strong white-oak timber 2 inches thick, and the pieces not more than 5 inches wide, morticed by a tenon $\frac{3}{4}$ of an inch thick, into an outside frame, $\frac{1}{4}$ inches wide, of the same thickness, all planed smooth, and fitted with true close joints. Each lateral piece of the gate to be fastened to the outside frame by a seasoned white-oak pin $\frac{3}{4}$ of an inch in diameter, through the frame and centre of each tenon; and the gate centrally through its longest side to be fastened to the inner side of a shaft (cut to receive it) 5 by 6 inches square, and extending from the bottom of the culvert to within 1 foot of the bottom of the cap on the posts of the head gate frame. The gate to be secured to the shaft by a row of pins of seasoned white-oak, $1\frac{1}{2}$ inches in diameter, through the centre of the broadest side of the shaft and the centre of each lateral piece of the gate. The shafts will be let partly into the ties of the frame for the head gates, and be secured by a piece of timber notched and fastened to the cap and ties, to form grooves for the shafts to move in. The sliding gates will run in rabbits cut in the posts of the head gate frame for that purpose.

The ties, caps, and pieces of timber in the other parts of the head-gate frame, are square timbers 10 by 12 inches and of such lengths as are shown in the plan.

The cribs will be filled with gravel, if it can conveniently be found, otherwise they will be filled with earth well packed in, and the space between the head or parapet walls of the culvert, over the covered timber, will be puddled in the best manner, as well as the filling on each side of the structure and the sheet piling.

A double row of sheet piling will be placed in front of the culverts, and carried down on the lower side to midway the length of the wall, to meet the sheet piling extending from the lock and abutment.

In the 18 inch timbers for water-ways, none will be admitted of less length than 27 feet after they are laid, measuring on the line of the range,

exclusive of the lap in joining, which must be formed by cutting away one-half of the timber in its vertical height, for two feet in length, so that the lap will be on the upper side of the timber and in the direction of the head of the culvert; the timbers are to be joined with a true close joint, and secured by two well seasoned white-oak tree-nails, 2 inches in diameter, placed 18 inches apart, and sunk through both laps 12 inches into the timber below; the 18 inch timbers in the water-ways will be secured by similar tree-nails every six feet, sunk through the top course and one foot into the timbers that they rest on; at every point where a joint is framed in the crib work, or a timber crosses another, seasoned white oak tree-nails, 2 inches in diameter and 22 inches long, must be sunk into the timber their whole length.

The covering timbers for the culverts must be of white-oak, as well as all the timbers above the water; for those below, which is the principal part of the structure, as the covering timbers are submerged, walnut, oak, beech, and cypress may be used.

After the sheet piling and covering the dam shall have been completed, the space above the dam shall be filled with the best gravel that can be procured within one and a half miles of the site of the dam, on the river bank, to be approved of by the engineer, without removing the earth above it to a greater depth than 4 feet; the gravel shall extend above the dam 70 feet, as represented in the drawings.

The space back of the lock will be filled with clay and gravel mixed, and be well packed. In puddling, gravel, together with a small portion of clay or loam, shall be spread on in a regular layer not more than 6 inches thick, which will be kept wet and thoroughly mixed by treading of oxen, or horses, or a ram; successive layers of the same material and thickness, with the process of wetting and mixing, will be repeated until the requisite quantity shall be obtained.

Guard-banks will be raised from the lock and abutment, and extended up the river on both sides, about two miles, of such height as may be deemed necessary to secure the bank from the overflowing of the floods.

Ten feet under the centre of the bank will be grubbed free from roots, and the timber on the spaces which the bank will occupy beyond the grubbing will be chopped even with the surface of the earth, and, with the roots, brush and logs, be removed to ground lying between the bank and the river. The earth on the space which was grubbed, to the depth of one foot, shall be removed to the outside of the bank, and the ditch formed in the centre of the space so cleared off of 3 feet wide at the top and 1 foot at the bottom, and 18 inches deep, or two and a half feet deep from the surface of the earth. No sticks, brush, leaves, grass or timber of any kind shall be permitted to go into the bank; and in putting on the earth it shall be placed in successive layers of not more than 18 inches thick, and kept as nearly level as can be conveniently done. The earth to form it must be taken from the ground between the bank and the river.

The canals around the lock and the abutment will be excavated, except near the culverts, four feet below the water in the pool of the dam—will be 26 feet wide on the bottom, with slopes to the banks of one and three-quarter feet base to one foot perpendicular rise. The cor-

tractor will be required to throw the excavation on either side of the canals or on both sides, and to keep the surplus earth of nearly an uniform width and height under the direction of the engineer. The price bid for excavation for these canals must cover the cost of the clearing and grubbing where it occurs.

MOUNT CARMEL, Aug. 21, 1838.

Notice to Bidders.

Propositions must state a price for each item of work given in the estimates, which will be understood as covering all expenses.

The price bid for excavation in the lock and abutment pits, below water, and the general items for the dam, must include all costs for coffer-dams and bailing water. The price bid for masonry will include all the cost of furnishing, dressing, laying in cement, and delivering the stone in the wall, when the same shall be completed.

The price bid for excavation will be understood to include all the various kinds of earth which may be found, together with all the detached stones which measure less than one-third of a cubic foot.

The price bid for timber in the several structures will include the entire cost of delivering, counter-hewing, raising, framing, tree-nailing and bolting.

The price bid for plank will include the cost of furnishing it on the ground, planing, jointing, spiking, &c.

The price bid for iron will include the cost of delivering, working, driving, and every variety and form of work to which it may be used in the structures.

The item of square timber, in the estimate of the quantities in the gates and mitre sills, is an exception, in the proposals, to the rule in relation to the timber, as it contemplates only the delivery of the best kind of large white-oak timber, rough hewn, selected especially for the use intended; that item, and the bid for wood work of the lock-gates and mitre sills complete, will cover all the cost of constructing the gates, furnishing the plank used thereon, and rendering them ready for use, with the exception of the cast and wrought iron, which will be paid for by the pound.

The contractor will furnish the hydraulic cement, sand, and every article used in the work, which will be subject to the approval of the engineer; and any article which may be delivered in his absence, or which he will not receive, as not fit or of suitable quality to go in the works, shall be immediately removed beyond the reach of the workmen, at the expense of the contractor.

Every part of the work connected with the canal will be subject to the most rigid inspection of the Commissioner and engineer, and the contractors will be expected to conform in all respects to their directions.

The right will be reserved of making any alterations in the plans of the work which further observation may show to be necessary; and if such change shall increase the cost of the work, the amount of this increase shall be estimated by the engineer, and paid to the contractor.

Inasmuch as the water has hitherto been too high for a visible examination of the bed of the river, the site now marked out for the works may be changed a short distance, not exceeding 200 feet, either up or down the river; and also, as the quantities of excavation, timber foundations, and amount of masonry will depend, to some extent, on the character of the rock bed of the river where the pits shall be opened, the estimates of the quantities now exhibited may vary in amount, from the careful examination and measurement of the work in its progress; but this shall not furnish ground to claim an extra price on any of the items proposed for.

Bidders to whom the work may be assigned, if not themselves good mechanics, will be required to employ one to superintend these structures, who shall be approved of by the Commissioners or engineer; and if, at any time during the progress of the work, any mechanic or workman employed on the work shall be thought to be incompetent, or unfaithful, or disorderly, such mechanic or workman shall be promptly discharged by the contractor.

In case the contractor fails to prosecute his work in such manner as to afford satisfactory evidence that it will be completed by the time stipulated, the right will be reserved to the Commissioners to declare the contract abandoned and void, at their option, to place an agent thereon, who shall employ hands, buy materials, and complete the work, the expense of which shall be charged to the contractor, and deducted out of the final settlement of his account.

Contractors will be expected to superintend their work in person. The sub-contracting of any part of the work (except in procuring materials) without the consent of the Commissioners, will subject the contractor to the liability of forfeiting the contract, at their option.

The contractors will procure the necessary timber and stone by purchase, and the work and materials will be at his risk.

The work must be commenced by the 14th of Sept. next, and completed by the 1st of November, 1840.

Bidders are notified that no extra allowance in addition to contract prices can in any case be allowed, and are requested to give the work a close examination, so that they may judge correctly of its value.

The proposals will state, in separate items, the prices of the masonry, on the contingency of the stone being procured at either of the quarries near Petersburg, Portersville, or Gaiter's on White river. It is the intention to have all the quarries opened to some extent, and a portion of the stone exposed, that their qualities may be ascertained, and in due time a selection made.

The contractors will be paid for opening new quarries a reasonable compensation, to be determined by the engineer, if the stone should prove of an inferior quality; and in case of receiving stone at other places than the quarries mentioned, to be governed in the price of the same by comparison of the distance they may be procured from, with the distance from the site of the quarries mentioned.

820 yards of stone have been delivered at the site of the works, for which the sum of \$8 33 per yard has been estimated. These stone will be delivered to the contractor at that price, to be used in the works,

and the amount will be deducted from the total sum which will be due to him on his contract price.

No deduction will be made for stone which may yield to the influence of the atmosphere, and any portion which may have failed, or shall fail, will be excluded from the work.

The payments will be made, on the estimates of the engineer, at intervals of one month each as nearly as can conveniently be done, in checks either on the Bank of Mount Carmel or the Bank of Vincennes, on articles delivered at the site of the works or for stone quarried and delivered near the quarry.

By order of the Commissioners.

D. BURR, *Principal Engineer.*

MOUNT CARMEL, *Aug. 21, 1838.*

HD
3890
I3
I44
1838
RARE
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